

1911 • FIFTY YEARS OF SERVICE TO COAL MINING • 1961

COAL AGE

AUGUST, 1961

The Sunnyhill 9 Story p 50

Experience With
Fire-Resistant Fluids p 55

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PRICE \$1



Ventilation for Continuous Miners... p 79

Meet Denis Plan
the Hercules Technical Man
who Pioneered the Introduction
of Short-Period Delays
in Southern Underground
Coal Mining



It was back in early 1957 when Denis Plan, veteran Hercules technical representative, and several large mining operators conceived the idea of using Short-Period Delays in southern underground coal mines.

Extending over a period of several years, field trials in many underground mines in the southern coal fields proved that the use of Short-Period Delays resulted in:

Reduced vibration, concussion, and noise
Reduced damage to roof, ribs, and pillars
Produced more uniform fragmentation and less fines
Savings—fewer drill holes needed with reduction of explosives consumption
Quicker mining cycle

Safer operations—less exposure for shot-firer—less smoke and less disruption of ventilation

No Vent® Short-Period Delay Electric Blasting Caps are available in delay periods as recommended by the United States Bureau of Mines for coal mine blasting. Leg wires, with the most modern plastic insulation, are manufactured in a variety of lengths for all mining needs.

For complete information on how No Vent Short-Period Delay Electric Blasting Caps can be applied to your underground mining operation, call your Hercules representative or write direct to the office nearest you.



KRG1-1

Explosives Department
HERCULES POWDER COMPANY

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Hercules Tower

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Pittsburgh, Pennsylvania • Salt Lake City, Utah • San Francisco, California



New B.F. Goodrich tire compound gives coal hauler twice the run for his money

WHERE OTHER TIRES FAILED IN 4 MONTHS, BFG TIRES ARE STILL ON THE JOB AFTER 8 MONTHS!

SEVEN miles of mountainous, rock-strewn road separate the mine from the dumping point shown above. Fourteen hours a day trucks labor up and down 30% grades hauling 40-ton loads of coal. Conventional tires were cut to ribbons in only 4 months.

Then the company tried new B.F. Goodrich Rock Service tires made of new Cut Protected compound.

BFG developed this compound to defy costly tire cutting and chipping. Result: these BFG tires are still going strong after 8 months—and they cost *no more* than standard-compound tires.

The rugged Rock Service tread is a "natural" for coal field work. Massive cleats dig in and pull up steep grades, provide equal traction for backing in soft dirt (above). And B.F. Goodrich Flex-Rite Nylon cord construction withstands double the impact of ordinary materials, resists heat blowouts and flex breaks. More

Rock Service tires can be retreaded for more service per retread.

Your B.F. Goodrich dealer can help you lower the cost of coal hauling. He has a longer-wearing, money-saving tire for every mining job. Give your BFG dealer a call today—he's listed under Tires in the Yellow Pages. *The B.F. Goodrich Company, Akron 18, Ohio.*

Specify B.F. Goodrich Tubeless or tube-type tires when ordering new equipment



OUTSELLS COMBINED COMPETITION 10 to 1 in providing 100% fire-resistant hydraulic lubrication for mines

KENTUCKY RIDGE COAL COMPANY

PRODUCERS OF CROCKETT COAL
FIELD, KENTUCKY

FRED T. LOVING, JR.
GENERAL MANAGER

LESTER CHITWOOD
GENERAL SUPERINTENDENT

April 24, 1961

Hulburt Oil & Grease Company
Trenton and Castor Avenues
Philadelphia, Pennsylvania

Gentlemen:

We began changing over to Hulburt's Hul-E-Mul during Miners vacation in 1960, and have used Hul-E-Mul 100% or in all of our hydraulic mining equipment since September 1, 1960.

Prior to our switch to Hul-E-Mul we were using premium quality conventional hydraulic oil. When we switched to Hul-E-Mul our only reason for doing so at the time was for the additional protection for our men, mine, and equipment that is offered by the flame resistant properties of Hul-E-Mul. By using Hul-E-Mul our oil consumption has been cut to the extent that our cost of Hul-E-Mul is approximately 45% less than when using conventional hydraulic oil. This includes the cost of using conventional hydraulic oil for flushing the conventional hydraulic oil from all of the equipment twice.

We have had less hydraulic pump and motor failures with Hul-E-Mul than we had with conventional hydraulic oil, and the overall performance of our equipment has been excellent.

We buy Hul-E-Mul in 55 gallon drums and store it outside. We have not had any storage problems regardless of weather conditions.

Realizing from experience the dangers of underground fires, especially those fed by oils, we feel that Hul-E-Mul is a very necessary and inexpensive form of insurance against same. Considering this and the savings on oil costs, and equipment repairs, we could do nothing but recommend Hul-E-Mul very highly to anyone considering its use.

Yours truly,

Fred T. Loving, Jr.
Fred T. Loving, Jr.

BOX SCORE

Mines using Hul-E-Mul 100% hydraulically 14
Other mines partially using Hul-E-Mul 59
Underground equipment satisfactorily
being lubricated with Hul-E-Mul over 400

GALLOWAY LAND COMPANY

P. O. BOX 1906

CLARKSBURG, WEST VIRGINIA

PHONES: MA 3-2865
MA 3-2866

May 29, 1961

Hulburt Oil & Grease Company
Philadelphia, Pennsylvania

Gentlemen:

We have been using Hul-E-Mul at our Dawson Mine for the past five months in 11-BU Joy Loading Machines, 5-SC Shuttle Cars, 10-SC Shuttle Cars, Fletcher Roof Drills, 29-U Jeffrey Cutting Machines, and 460 Goodman Loading Machines.

At present, Hul-E-Mul is in use in 100% of our underground equipment.

We have had no pump failures since installing the Hul-E-Mul solution. Better pressures and much less consumption have been very noticeable.

To date, our consumption of hydraulic fluids has been two-thirds less; therefore, we feel that Galloway Land Company has already paid for the cost of original installation by having a much lesser consumption of fluid, and will continue in savings thereby, in addition to the lessened damages of fire from hydraulic oils.

Yours truly,

GALLOWAY LAND COMPANY

Arthur B. Ord

Arthur B. Ord
Superintendent

ABO:db

M. W. FRESA
PRESIDENT

MCCANDLISH COAL CORPORATION

MCCANDLISH MINE

MEADOWBROOK, W. VA.

PRODUCERS OF PITTSBURGH COAL

May 17, 1961

OFFICE 2-4301
MINE 612-3084

Hulburt Oil & Grease Company
Philadelphia, Pennsylvania

Gentlemen:

We have been using your Hul-E-Mul, fire resistant hydraulic fluid for the past four months in approximately 75% of our mining equipment. Today, we are using it 100% on all hydraulically operated underground equipment. We are pleased to inform you that Hul-E-Mul has been a you guaranteed it to be.

After the initial installation of Hul-E-Mul in our equipment noticed a substantial reduction in our operating cost. Our records show that we now use approximately 60% less Hul-E-Mul than conventional fluids. This, of course, has resulted in a big savings to our company.

MC CANDLISH COAL CORPORATION

M. W. Fresa

M. W. Fresa
President

AWS/lc

SEANOR COAL CO.

P. O. Box 385

Saltsburg, Pennsylvania

April 3, 1961

TELEPHONE:
Office-Saltsburg ME 6931-1181
Mine-New Alexandria 65
Tolby-Saltsburg 781

EXECUTIVE OFFICES:
130 Wall Street
New York 5, N. Y.
Waltham 2-1000

Hulburt Oil and Grease Co., Inc.
Philadelphia, Pennsylvania

Gentlemen:

We have used Hul-E-Mul for approximately 4 months, and have been using it 100% for 3-1/2 months on 60 pieces of equipment. We have cut our lubrication cost in half as compared to previously used conventional hydraulic oil. Performance of equipment has been, in virtually all instances, equal to that achieved when using a premium conventional oil and in some equipment the performance has been considerably better.

We are very pleased with the safety feature, the cost, and the performance of Hul-E-Mul. We are buying the fluid in tank truck shipments and are storing it outdoors in bulk. We stored it all last winter outdoors and temperatures at times reached -15°F and we never had any difficulty with the emulsion freezing or poor flow properties.

Very truly yours,

SEANOR COAL COMPANY

Ken Ruffner

Ken Ruffner
Superintendent of Maintenance

KNIGHT COAL COMPANY

P. O. BOX 2004

CLARKSBURG, WEST VIRGINIA

Hulburt Oil & Grease Co.
Trenton and Castor Avenues
Philadelphia, Pennsylvania
May 19, 1961

Gentlemen:

We had been having considerable trouble with our hydraulic mining equipment at our Albert Mine No. 2, both with costly repairs and high maintenance costs, when representatives of your company approached us about changing to your product.

These gentlemen did a terrific selling job for which we are grateful. They made a survey of our operation, which took a great deal of time on their part and recommended that we change to Hul-E-Mul. In doing this they explained the safety features of their product, along with the reduction in maintenance costs and machine repairs.

We began changing over to Hul-E-Mul in February of this year and by the middle of March we had changed over to 100% use in all our hydraulic mining equipment. We are very happy to report that the change has been unbelievable. We have reduced our consumption cost by over 40% and our repair cost and machine down time has been reduced tremendously. We are happy to recommend this product very highly.

Very truly yours

KNIGHT COAL COMPANY

Charles Childers
Charles Childers
Asst. Treasurer

NOTE! Virtually every mine in the U.S.A. using emulsions 100% specifies HUL-E-MUL Fire-Resistant Hydraulic Fluid. Here's the reason why: Hul-E-Mul is the only emulsion that can give both economy and excellence of performance.

Hulburt

OIL & GREASE COMPANY
PHILADELPHIA 34, PA.

PUT YOUR
— 3/8" —
COAL
through the
BIRD-HUMBOLDT



PUT YOUR
1"X1/4"
COAL
through the
BIRD-HUMBOLDT



Oscillating Screen Centrifuge

The minus 3/8" from sludge tanks or screens comes out thoroughly dewatered — down to as low as 4% surface moisture

The stoker size coal comes out at 2 to 2 1/2% surface moisture so it can go right to the cars without costly thermal drying

The following operating advantages and economies apply to both:

Solids Recovery: 98% plus

Degradation: almost 0

Capacity: up to 100 tph

Screen Life: up to 3000 hrs. or more

Power Savings: 0.2 KWH or less per ton

This is the way to dewater your coal — fines or stoker size. Ask us to mail you the latest Bulletin on the Bird-Humboldt.

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**MACHINE
COMPANY**

SOUTH WALPOLE, MASSACHUSETTS

BUILDERS OF THE COMPLETE LINE OF SOLID-LIQUID SEPARATING EQUIPMENT

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This Month in **COAL AGE**

August, 1961

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 Big Producer p 50
 Fire-Resistant Fluids:
 What 100% Users Found p 55
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 Separate-Split Ventilation Of
 Continuous-Mining Faces p 79
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Stripping, Preparation

Sunnyhill No. 9: Ohio's

Newest Big Producer p 50

Latest addition in a continuing program of expansion and modernization, Peabody's Sunnyhill No. 9 adds 2,000,000 tons per year to company capacity. Setting the pace at the stripping operation is a Bucyrus-Erie 65-yd stripping shovel working around the clock. Coal travels to the McNally Pittsburgh preparation plant in 70- and 50-ton Dart trucks. Clean coal leaves the plant at the rate of 1,000 tph and travels either to four 1,500-ton stockpiles or to railroad cars. Plant features include two-stage washing, a 480-tph Heyl & Patterson fluid-bed dryer, one-man control of car loading and vinyl-coated steel sheathing in Peabody colors.

Safety

Fire-Resistant Fluids . . .

What 100% Users Have Found p 55

Equal or better production and equipment performance, no pump problems, lower consumption of hydraulic

fluid and lower cost per ton are major benefits cited by users of emulsion-type fire-resistant hydraulic fluids. These conclusions are based on a *Coal Age* survey of nine mines reported to be "100%" on the fire-resistant fluid. Most mines handle the fire-resistant fluid the same as normal petroleum oil and all but one buy it premixed. Users also report that operating temperature of the emulsion is lower than regular petroleum oil and the emulsion tends to seal leaks.



Preparation

Simplicity in Design . . .

Control for Quality p 60

To meet the challenge of changing market conditions, ElKay Mining Co., has modernized preparation facilities and strengthened its quality-control programs. Simplifying design, utilizing a minimum of equipment and, in some instances, making good use of existing equipment characterizes the ElKay operation. The practical combination of new and old units achieve and exceed quality standards with a minimum work force.

(Continued on p 7)

COAL AGE, August, 1961, Vol. 66, No. 8. Published monthly by McGraw-Hill Publishing Co., Inc. U. S. subscription rate for individuals in the field of the publication \$3 per year, single copies \$1 (for rates elsewhere see p 9). Executive, Editorial, Circulation and Advertising offices: McGraw-Hill Building.

330 W. 42nd St., New York 36, N. Y. Printed in Philadelphia, Pa.: second-class mail postage paid at Philadelphia, Pa. Postmaster: Please send form 3579 to Fulfillment Manager, Coal Age, 330 W. 42nd St., New York 36, N. Y.

Send for new movie, "How to Weld (USS) 'T-1' Steels"



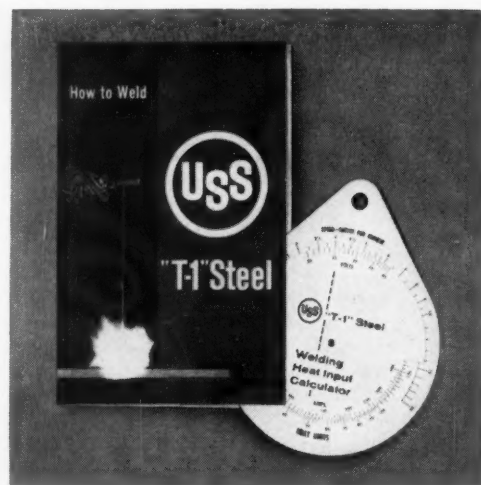
This mark tells you a product is made of modern, dependable Steel.

This new 18-minute, 16mm color motion picture shows concisely the practices involved in welding USS "T-1" Steels. If you are fabricating "T-1" Steel in your shop, this film and copies of the booklet will be a big help in demonstrating the proper technique to your welders. Fill out the coupon below and indicate the number of booklets you will need.

Included in the booklet is a handy welding heat-input calculator that helps a welder choose the proper welding machine settings. The film, together with the booklet, will help every welder to weld USS "T-1" Steels readily and successfully.

We'll gladly lend you the film and furnish enough free copies of the booklet and heat-input calculator for your shop personnel. USS and "T-1" are registered trademarks.

United States Steel Corporation • Columbia-Geneva Steel Division
National Tube Division • Tennessee Coal and Iron Division • United States Steel Supply Division • United States Steel Export Company



United States Steel
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Gentlemen:

Please lend me your 16mm color, sound movie, "How to Weld USS 'T-1' Steels."
Also, send me _____ booklets of the same title. I understand there is no obligation.

Name _____

Title _____

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Address _____

City _____ Zone _____ State _____

United States Steel



THIS MONTH IN COAL AGE (Continued)

Maintenance Ideas

What You Should Know

About Power-Factor p 64

A good system power-factor can save your company money by reducing power bills, improving motor performance and taking the system out of the low-power-factor penalty area. Power-factor correction is a matter of economics and it is as important as controlling supply cost, maintenance, production downtime and all other cost-reducing measures which are necessary to mine coal at a profit today. Some of the things you should know about power-factor are discussed in layman terms for easy understanding. This feature also includes all calculations necessary to correct power-factor—under actual power conditions—from 75% to 95%. And, from actual figures, shows the monthly and annual savings in power costs, in this case \$5,815.20 annually.

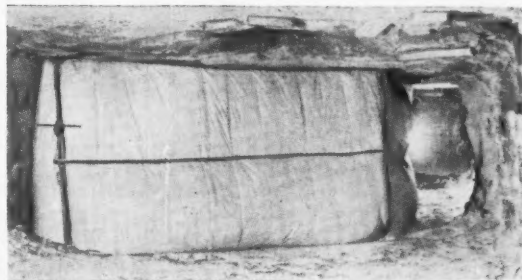
Methane Drainage

William M. Merritts, USBM

Degasifying Before Mining p 74

Heavy methane emissions during continuous mining of the Pittsburgh bed in northern West Virginia resulted in drilling 100- to 230-ft boreholes ahead of the working faces in outside headings of multiple-heading entries to drain off the gas in advance of and during mining. To facilitate drainage, experiments with water infusion were conducted, effectively increasing gas liberation. Sinking of a power borehole in advance of the

entries provided an opportunity to see if vacuum exhausting would help. Test results indicated considerable drainage without suction and a substantial increase with.



Mine Ventilation

C. W. Connor Jr., U. S. Steel Corp.

Separate-Split Ventilation

of Continuous-Mining Faces . . p 79

No doors, except emergency doors at fans, are used at Gary No. 2, a mine which produces 5,000,000 cu ft of methane per day. Each working section is provided with its own split of air, and at the faces in development sections air is handled in a manner to provide a separate split over the mining machine and immediate return of this air. Plastic-covered, nylon-fabric checks are manipulated to provide this separate split and to eliminate check curtains in shuttle-car haulways.

Special—Step-by-step procedures for putting the system to work. (Continued on p 9)

This Month in **COAL**

SLOW START ON LAST HALF—The bituminous record in the weeks immediately following the vacation did little to encourage a boom spirit for the rest of the year. In fact one might find it easy to conclude from these early weeks that the industry would be fortunate to do as well in the last half as it did in 1960 in the same period. But if the economic forecasters are on the button with their predictions, the rate should pick up as the year wears on.

Anthracite continued to do an excellent job of holding its own up to the vacation period—and immediately afterward. A cold start on the 1961-62 heating season could mean, as previously noted, a tonnage approximating that of 1960.

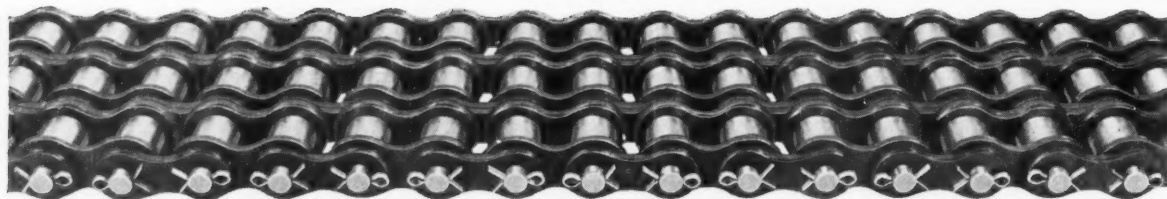
THE NONUNION PROPORTION—The vacation shut-down provides an indication of the extent of nonunion production in the bituminous industry. This year, the tonnage was 2,100,000 the first week and 1,300,000 the second. In 1960 the figures were 1,836,000 and 1,335,000 tons—in other words, about a standoff between the two years. But if field grapevine is any indication, the tonnage produced under side wage deals and various methods of escaping part or all the payments into the welfare fund was up significantly.

STEEL PICTURE—One of the big reasons why bituminous has lagged in the early months of 1961 can be found in the pig-iron production figures. In the first 5 mo of 1960 the total was 36,265,000 tons; in the same period in 1961,

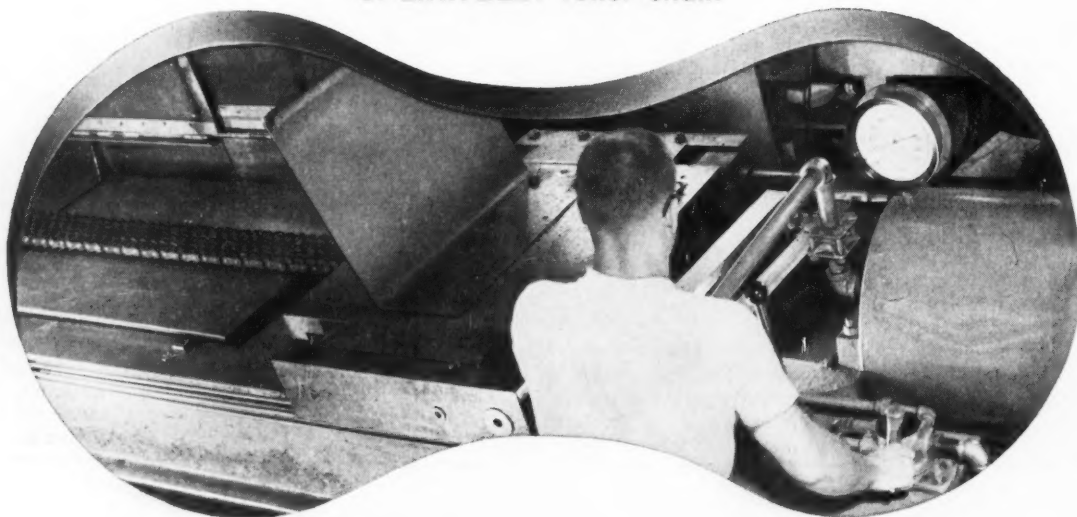
23,008,000 tons. Coal carbonized in the first 5 mo of 1960 totalled 41,485,000 tons; in 1961, 26,268,000 tons. The last half? Steel expects a good rate of business. If this comes to pass, a carbonizing rate exceeding May and June's plus 6,000,000 tons should be in the cards—with perhaps 7,000,000 or more in some months.

MORE NEW MINES?—For obvious reasons the past 2 yr has been marked by an almost complete cessation of new-mine development. At the same time existing operations have been going out at an accelerated rate. All this, plus the growth in demand that lies ahead, adds up to another era of active mine development. In fact, the start of the era probably is here. The new operations, incidentally, will tend to be big ones.

GETTING CLOSE?—If the claims of the Pacific Gas & Electric Co. prove out after operation of its Bodega Bay plant begins, the days of competitive nuclear power may be fairly close—in part a result of the government's recent action in cutting the price of uranium oxide to stimulate the construction of nuclear plants. PG&E says its nuclear power will cost 5.32 mills per Kwhr, which it also says is equivalent to its cost with \$2.25-a-bbl oil. Start of construction still awaits AEC and CPUC permission. Cost would be \$61 million for a capacity of 325,000 kw, with completion in 1965 if construction can be started in the summer of 1962.



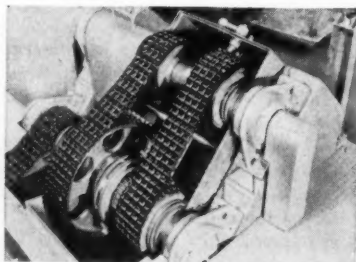
Here's
another of the
invisible extras that
insure the precision performance
of LINK-BELT roller chain



prestressing of multiple-strand chain guarantees uniform load distribution

Unless each strand carries its full share of the load, multiple-strand roller chain may fail. That's why Link-Belt's prestressing is so vital. Prestressing seats and cold-works the chain joint parts . . . assures equal load distribution across the chain, reduced elongation in service.

Prestressing is just one of many *invisible extras* that contribute to the greater strength and endurance of Link-Belt roller chain. Others include precise heat-treat control, pitch-hole



Quadruple-strand Link-Belt roller chain drives are used on this two-speed transmission. High speeds on short centers are easily handled.

preparation, shot-peening and burnishing of rollers. These features—plus painstaking precision and inspection in every step of manufacture—assure you of chain that can easily cope with today's heavy loads and high speeds.

For engineering assistance in applying industry's preferred roller chain, contact your nearest Link-Belt office or authorized stock-carrying distributor. Look under chains in the yellow pages of your local telephone directory.

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LINK-BELT
ROLLER CHAINS AND SPROCKETS

Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarborough (Toronto 13); South Africa, Springs. Representatives Throughout the World.

15,556

THIS MONTH IN COAL AGE (Continued)

Equipment Leasing

Robert Sheridan, Nationwide Leasing Co.

Equipment Leasing p 84

Ability to modernize while retaining the use of its working capital is a major advantage of leasing equipment. Other reasons are the increasing cost of equipment and unrealistic government depreciation schedules. All types of equipment can be leased. The company desiring equipment supplies the list, which is purchased by the leasing company and shipped directly to the lessee's plant. Price of equipment, length of lease and the form of payment are specified by the lessee. Periods generally range from 3 to 10 yr—sometimes shorter or longer. Leasing offers the lessee a greater cash flow than any other form of financing. There may be additional tax advantages.

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COAL AGE, VOLUME 66

AUGUST, 1961, NUMBER 8

COAL AGE, with which are consolidated The Colliery Engineer and Mines and Minerals, is published monthly by McGraw-Hill Publishing Co., Inc. Founder: James H. McGraw (1860-1948).

SUBSCRIPTION PRICE: Available only by paid subscription. Publisher reserves the right to refuse nonqualified subscriptions. Subscriptions to Coal Age solicited only from executives, management, engineering, operating and supervisory officials associated with companies engaged in the mining and preparation of anthracite, bituminous and lignite coal. POSTAGE AND COMPANY CONNECTION MUST BE INDICATED ON SUBSCRIPTION ORDERS. Send to address shown in the box below. U. S. and possessions and Canada, subscription rate for individuals in the field of the publication \$3 per year, \$5 for 3 years, single copies \$1; elsewhere \$15 per year, \$40 for 3 years payable in advance; single copies \$2.

EXECUTIVE, EDITORIAL, CIRCULATION and ADVERTISING OFFICES: McGraw-Hill Building, 330 West 42d Street, New York 36, N. Y. Telephone: Longacre 4-3000. TWIX: TWX N. Y. 1-1636. Cable address: MCGRAW-HILL, N. Y.

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COAL AGE articles are indexed by Engineering Index. Coal Age's own index is published annually in the December issue.

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COAL AGE • August, 1961

THIS MONTH ... In Mining Practice

LOADERS V. MINERS—On the basis of approvals reported in the first 7 mo of 1961 in Coal Age, new models of continuous miners are being developed at a ratio of over 4 to 1 over loading machines. But since the ratio of sales in 1960 was only a little better than 1 to 1, it may be concluded that the loader still is holding its own quite well in sales. In fact, under some conditions the conventional setup is preferred, and can yield very-high tons per faceman (for example, as at one mine featured in this issue, 108 tons).

ANOTHER DIESEL STEP?—The adoption by the Bureau of Mines Jan. 16, 1961, of Schedule 31, covering diesel-powered transportation equipment in gaseous noncoal mines opened up another possible channel to eventual coal-mine use. Plans now are to place a shuttle-car with a Schedule 31 plate in a coal mine under special permit. If the plans carry through, the experiment should start in the early fall. Some 6 mo or so afterward material data on operation and safety should be available.

HYDRAULIC PROGRESS—The stage of actual use of hydraulic equipment in mining steeply pitching coal may soon be reached. What probably is the pioneer installation in a commercial mine is reported to be giving good results, and the expectation is that an output of 1,000 tpd may be reached in the not-too-distant future. Meanwhile, investigation of possibilities in flat coal continues.

DEWATERING TAILINGS—As the use of froth flotation increases the magnitude of the tailings-dewatering job raises with it. From Great Britain comes a report of a new range of flocculation agents which provide settling rates of 2 fpm or more. As a result, settling is done in a simple cone, eliminating thickener and filter. Water overflows the top of the cone and the sludge is trapped out of the bottom. It can be handled, according to the report, by scraper or belt conveyor or other normal methods.

SAFETY IN '61—Pennsylvania anthracite improved its safety record markedly in the early months of 1961, cutting the rate per million tons from 2.03 to 1.31. Bituminous, however, slipped, and its January-May rate rose to 0.81 per million tons, compared to 0.73 in the same 5 mo in 1960. This rise occurred in spite of improvements in some areas and states, such as Illinois, whose 5-mo rate was 0.16 per million. And Pennsylvania, primarily deep mining, attained a 5-mo rate of 0.40.

NOISE CUTTER—Detonating fuse, along with its advantages, has the disadvantage of noise when used as a trunk line in the open. Methods of cutting the noise include burying the trunk, delay caps at each down line instead of trunk or use of complete electric-delay systems. New is a 2-grains-per-foot PETN detonating cord with adapters and delay elements to replace the regular detonating fuse, as well as other initiating systems. Noise is cut to unobjectionable levels and safety is enhanced.

ALUMINUM DUMP BODIES WEIGH 50% LESS...

Haul Up to 3,500 Lb
of Extra Payload for Added Profit

*Durable Alcoa Alloys Defy Denting
to Save Maintenance Dollars*



Dent Resistant

Modern Alcoa Aluminum alloys, advanced design and new fabricating techniques combine to give today's aluminum dump bodies far greater dent and impact resistance than standard steel construction. They withstand years of hard knocks and grueling service. Service records prove aluminum assures longer unit life with less maintenance.



Light Weight

When you trim a pound of dead weight from a rig, you take on an extra pound of payload worth a dollar per year in extra revenue. Producing earnings as much as 16 per cent above average, lightweight dump bodies of Alcoa® Aluminum can pay for themselves in less than a year of operation. From then on, it's *all extra profit* for the operator.

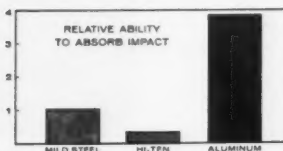


Corrosion Resistant



Aluminum's corrosion resistance helps hold down repair costs to boost earnings even further. Needing no protective coating of paint, aluminum alloys stand up under the corrosive and abrasive attack of many commonly hauled bulk materials. Chemicals, salt, high-sulfur coal, fertilizers, lime and sand can't inflict damage, so aluminum dump bodies stay new-looking far longer than steel, wash clean in half the time—and dump clean every time.

A dump body folder, which tells how many operators have increased profits by switching to aluminum, is yours for the asking. Write to Aluminum Company of America, 1789-H Alcoa Bldg., Pittsburgh 19, Pa.

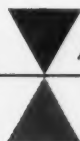


PROOF: Aluminum Is Tougher
Tougher than steel! Dump bodies built of Alcoa Aluminum alloy can take *three* times as much impact as steel, at *half* the weight

Member



American Trucking Industry



ALCOA ALUMINUM

ALUMINUM COMPANY OF AMERICA

For exciting drama watch "Alcoa Presents" every Tuesday evening—ABC-TV

OKOCORD SHOVEL CABLE—

“Around the Clock” and ready for more

This Paul Bunyon of a shovel . . . with a 70 cubic yard appetite . . . has to work “around the clock” to earn its board and keep, and it relies on Okocord power cable to supply its muscle.

Taking a beating is nothing new for Okocord power shovel cables. They're engineered to be tough. Extra flexible stranding of conductors for improved flexibility, heat-resistant Okonex insulation, strong nylon braiding that add extra strength to a tough mold-cured Okoprene jacket are some of the quality features built into every foot of Okocord cable. Okonite's self-imposed manufacturing standards are your assurance that these quality features are built-in to last.

Rely on Okonite Cable'bility* next time you need a portable cable. Okonite's full line of mold-cured Okocords are readily available for most any type of mining job. And . . . for those special jobs . . . our engineering staff can help you in the recommendation and design of an Okocord to fit your specific needs.

For the complete story on Okocord portable cables, write for Bulletin CA, 1108. The Okonite Company, Subsidiary of Kennecott Copper Corp., Passaic, N. J.

8409

*Cable'bility—Cable craftsmanship since 1878.

WORKHORSE CABLE—Here's a cross-section drawing of the Okocord Shovel Cable that does the job. This Type SHD-GC cable, rated at 8KV, has 3 ground wires, one insulated for use as a relay wire for policing the grounding circuit.



*where there's electrical
power . . . there's*

OKONITE CABLE





STYLE CMF has flat carbide tip for fast, free-cutting action without drag.

STYLE CMC has "plug-type" cylindrical carbide tip for protection in extremely rugged cutting conditions.

WOBBLE-FREE RED BITS with uniform lug wear

V-R Red Bits, have carbide tips manufactured especially for mining by V-R. Call your representative today and put these "wobble-free" V-R Red Bits to work on your equipment. VASCOLOY-RAMET CORPORATION
340 Market Street, Waukegan, Illinois



FIRST CHOICE in more and more mines

M-841

COAL AGE • August, 1961

13

only

FLUOSOLIDS®

combines ...

- compact, unitized design
- pulverized coal fuel system
- pressurized operation
- uniform control
- adaptability to all tonnages and feed sizes

for simplest, most economical

Since the Dorrco® FluoSolids System for coal drying was introduced by Dorr-Oliver on a commercial basis in 1954, its phenomenal success has caused a revolution in coal drying techniques. Despite advances made in other systems, the basic simplicity and efficiency of the Dorrco design have remained unchallenged.

The Dorrco FluoSolids System is the only coal drying equipment combining the following advantages:

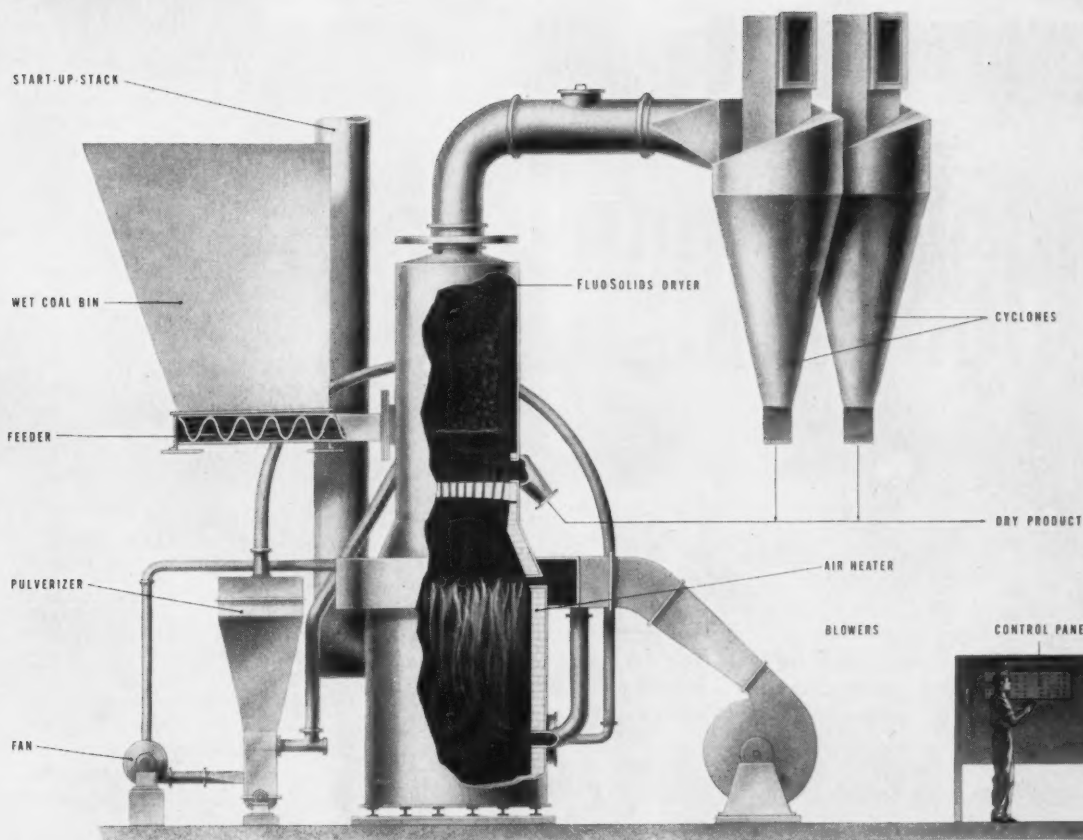
COMPACT, UNITIZED DESIGN: Air pre-heating and coal drying are carried out in a single basic unit, without the need for a separate furnace, stokers, or other auxiliary equipment. Space is conserved, installation simplified and maximum use made of heating BTUs.

PULVERIZED COAL FUEL SYSTEM: The modern Dorrco design includes a system for burning pulverized coal automatically extracted from the drying compartment.

Rapid start-ups and shut-downs are possible and no fuel is burned during shut-down as in banked stokers. No ash handling equipment is required. The system lends itself to accurate, automatic control, with quick response to varying feed conditions.

PRESSURIZED OPERATION: Pressurized hot air supplied to the drying compartment improves drying efficiency, eliminates the need for an exhaust fan to handle dirty and corrosive exhaust gases. Compared with other systems, lower air volumes are required with corresponding savings in horsepower. Easily controlled humidity conditions prevent overdrying and promote maximum cyclone efficiencies.

UNIFORM PRODUCT CONTROL: Feed rate adjusts automatically with variations in moisture to give uniform drying and complete control of product.



coal drying

ADAPTABILITY TO ALL TONNAGES AND FEED SIZES:

The Dorco FluoSolids System is applicable to operations as high as 800 TPH in a single unit. Feeds can vary from filter cake to 1½" x 0 coal.

The FluoSolids Dryer is the most advanced equipment available to meet today's demands for automation and efficiency in economical preparation plant operation. For information on its application to your particular specifications, write Dorco-Oliver Incorporated, Stamford, Connecticut.

HERE'S HOW THE DORCO FLUOSOLIDS SYSTEM OPERATES:

The drawing above shows the essentially simple operation of a typical FluoSolids coal drying system. The basic unit is a combined air pre-heating chamber and drying compartment separated by a constriction plate. Heat is generated in the lower chamber by burning coal which is withdrawn automatically from the drying unit above and pulverized before being supplied to the burner.

Hot gases under moderate pressure, tempered by the introduction of additional air from a bustle pipe midway around the heater, rise through the constriction plate into the dryer. Wet feed is automatically conducted into the drying compartment by a screw conveyor.

The action of the pressurized gases "fluidizes" the incoming coal, holding it in suspension so that every particle is surrounded by a film of hot gas causing extremely rapid heat transfer rates. Consequently, water evaporation is practically instantaneous. Finer fractions of dried coal are carried upward and collected by a cyclone system. No exhaust fan is needed. Larger coal particles are automatically and continuously discharged.



DORR-OLIVER

WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT

NEW! CARMET[®] BR and RB Quick-Change Bits

For Faster Changes ... For Longer Life

Faster bit changes and fewer of them are yours with the new Carmet cutter bits designed for tool blocks using a Neoprene cylinder to hold bits without setscrews. Special Carmet advantages make cutting easier, tools last longer.

B style has a flat, square back gage stop to prevent tearing the block and wearing the neoprene, and a front removal notch. RB has a front gage stop and back removal notch for applications where it is easier to remove the bit from the back. The RB's two step tip design leads to easier regrinding, and lower grinding costs.

Detail features of these bits are shown at the right, and both are available with open faced, full radius carbide inserts (designated B and RB), or with the round, cylindrical plug insert (designated BR and RBR).

Why these new Carmet Cutter Bits are Better and Last Longer

- ✓ Gage stops are flat — designed to prevent battering and swedging of tool blocks.
- ✓ Gages are a full $\frac{3}{8}$ inch and have smooth edges to eliminate splitting and mushrooming of blocks. This design also insures longer life for the Neoprene cylinder that holds the cutter bit.
- ✓ Three grades of carbide are available in Carmet cutter bits—to give you long life by matching the right carbide grade to your cutting requirements.

Quality Is In Every Carmet Cutter Bit

Carmet makes its own cemented tungsten carbide inserts. Carmet control over all phases of bit manufacture is your guarantee of top quality.

Call on your local Carmet distributor for mining tools with quality built in all the way through. He has complete stocks of the Carmet tools you need and can help you in their selection because he knows local mining conditions. And, your Carmet distributor is always glad to send out the Carmet field engineer to help you solve tool problems and cut mining costs—or even set up an entire tooling program for your particular mining operation.

Insist on the best in tools and local service. For a catalog supplement sheet on the BR and RB quick change bits, call your local Carmet distributor (see list), or write: Allegheny Ludlum Steel Corporation, Carmet Division, Ferndale, Detroit 20, Michigan. Address Dept. CA-8.

CARMET 
CEMENTED CARBIDE • DIVISION OF ALLEGHENY LUDLUM

BR-3
Special Cutter
Bit



Front
Removal Notch
Three Carbide
Grades to select from
Maximum clearance
for easier cutting—no
heeling or drag Flat, square gage stop
Notch for Neoprene Cylindrical
wedge

B style cutting bits are the same as
above with an open-faced radius
Carmet Carbide insert.

RB-3 Special Cutter
Bit With Front
Gage Stop



Easier regrinding—
saves grinding costs
New removal notch

Flat Gage Stop prevents wear on
block and Neoprene

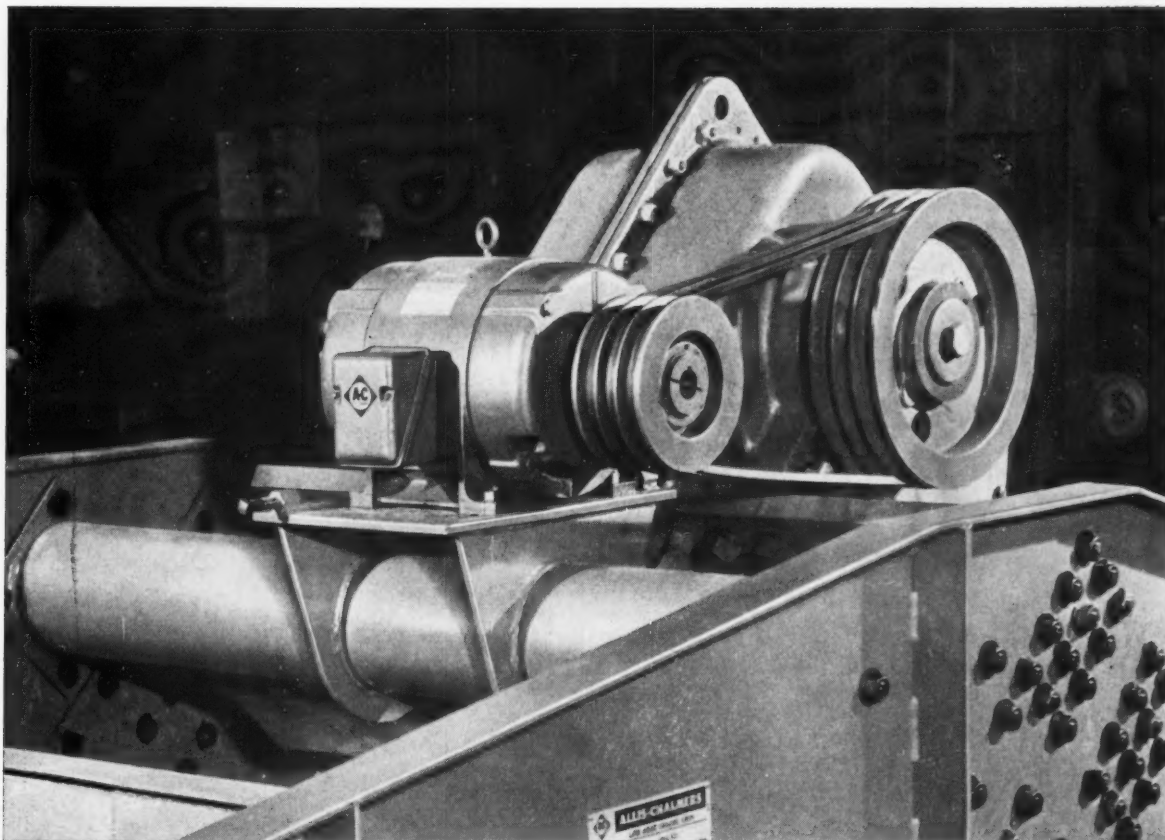
RBR-3 style cutting bits are the same
as above with a round cylindrical
Carmet Carbide plug-type insert.

Get more information from your local Carmet distributor:

Supplement to the Carmet Mining
Tool Catalog lists advantages and
quantity prices of the new time-
saving bits. For your copy see your
distributor, or write Carmet.

Birmingham Bolt Co., Ensley, Ala.
Bluefield Hardware, Bluefield, W. Va.
Brace-Mueller-Huntley, Inc.
Offices: Buffalo, Rochester &
Syracuse, N.Y.
Carbon Transfer, Helper, Utah
Carlsbad Supply Co.,
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Consolidated Supply Co., Picher, Okla.
C. F. Gharst Supply Co.,
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Charleston, W. Va.
W. B. Thompson Co.,
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R. A. Young & Sons, Inc., Fort Smith, Ark.

ALLIS-CHALMERS



Aero-Vibe, Low-Head, Ri-pl-Flo and Super-Seal are Allis-Chalmers trademarks.

The motor rides piggyback

Another Allis-Chalmers first goes to market...

Low-Head screen with direct-mounted motor for lower costs

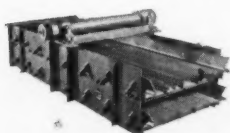
With these advanced screens, you shave *dollars* from installation and operating costs... without sacrificing a penny's worth of performance.

You eliminate motor-supporting structures, belt tensioning and alignment problems. You save space, simplify inspection, cut maintenance time... and *profit* the difference.

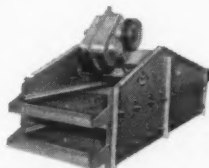
Too, you can count on the efficiency and reliability that is traditional because of Allis-Chalmers long expe-

rience in building vibrating equipment. TEFC or *Super-Seal* motors resist water, dust and abrasives... provide insurance against downtime that pays off in further savings.

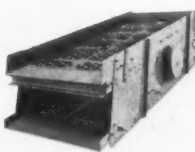
Let A-C engineers tackle your screening problems. Simply send them to us and we will submit an engineered recommendation on the most economical screen for your particular job. **Allis-Chalmers**, Industrial Equipment Division, Milwaukee 1, Wisconsin. A-1464



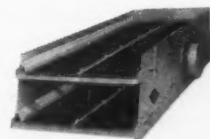
Model AVS AERO-VIBE inclined screen for economical scalping and coarse sizing.



LOW-HEAD horizontal screens for efficient coarse to fine sizing (wet or dry), rinsing, thickening, de-watering, media recovery.



Model XH RIPL-FLO inclined screens for cost-saving scalping and coarse sizing.



Model SH RIPL-FLO inclined screens for light scalping, coarse to fine sizing (wet or dry) and rinsing.

PERCY: "Such an interesting variety of nuts.
So well-made."

ALBERT: "And they all come from Bethlehem."

PERCY: "But where are the bolts?"

ALBERT: "Bethlehem makes those, too. But who
ever heard of squirrels eating bolts?"



BETHLEHEM STEEL COMPANY



BETHLEHEM, PA. Export Sales: Bethlehem Steel Export Corporation



for Strength...Economy...Versatility

HOW TO MAKE A LOW CAR HIGH IN CAPACITY



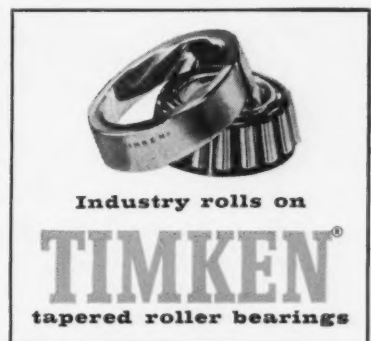
To give customers greater load capacity in a shuttle car only 27" high was one of the problems Joy engineers faced in designing this Model 18SC3 car. They solved it with a unique six-wheeled design using Timken® tapered roller bearings on all wheels. This feature helps maintain all six wheels in contact on uneven ground and enables the car to ride smoother. The design permits 4½-ton capacity and a conveyor 56" wide, 27 feet long.

Timken bearings are also used on the worm shafts,

hydraulic motor and pump shafts, steering axle kingpin and cable reel drive. Their tapered design lets Timken bearings take *both* radial and thrust loads. Their adjustability permits uniform, accurate running clearance, maintains gear alignment and concentricity of seals. Assembly is simplified because the separable components of Timken bearings permit independent assembly of cone on shaft, cup in housing. And the huge range of Timken bearing types and sizes permitted Joy to select exactly the right bearing for each application.



ON-THE-SPOT ENGINEERING SERVICE from our graduate engineer salesmen means a direct saving to you. Right at the design stage they can help you select the most economical bearing for the engineering requirement. They can help you fast on designing the mounting, too.



The Timken Roller Bearing Company, Canton 6, Ohio. Cable: "TIMROSCO". Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits. Canadian Division: Canadian Timken, St. Thomas, Ontario.



Cable failures cost \$720 an hour

A 60-cubic-yard power shovel can remove 4800 cubic yards of overburden in one hour, but it usually takes more than an hour to make a cable splice. Every minute the shovel is not operating, you're losing \$12. That's why it pays to buy the best—USS Tiger Brand Amerclad Cable.

Amerclad Cable is the toughest electrical cable you can buy. Year-round operations in all seasons won't affect its performance. It stays flexible in the coldest weather and hot, summer sun won't damage it. With its high-density jacket, vulcanized in a continuous lead sheath, Amerclad Cable

can be dragged over rocks and rough ground and still give long, trouble-free service. Concentric stranded conductors, made of the highest-quality annealed copper, are carefully pre-stressed to eliminate unequal tension and elongation without affecting flexibility.

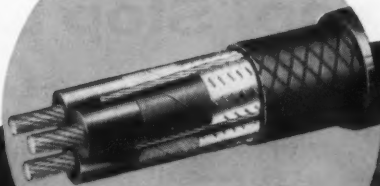
For every special job there's a standard USS Tiger Brand Electrical Wire and Cable. For complete information on Amerclad Cable, or any other type cable, write American Steel and Wire, Dept. 1214, Rockefeller Building, Cleveland 13, Ohio.

USS, Amerclad and Tiger Brand are registered trademarks.



**American Steel and Wire
Division of
United States Steel**

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
Tennessee Coal and Iron Division, Fairfield, Ala., Southern Distributors
United States Steel Export Company, Distributors Abroad



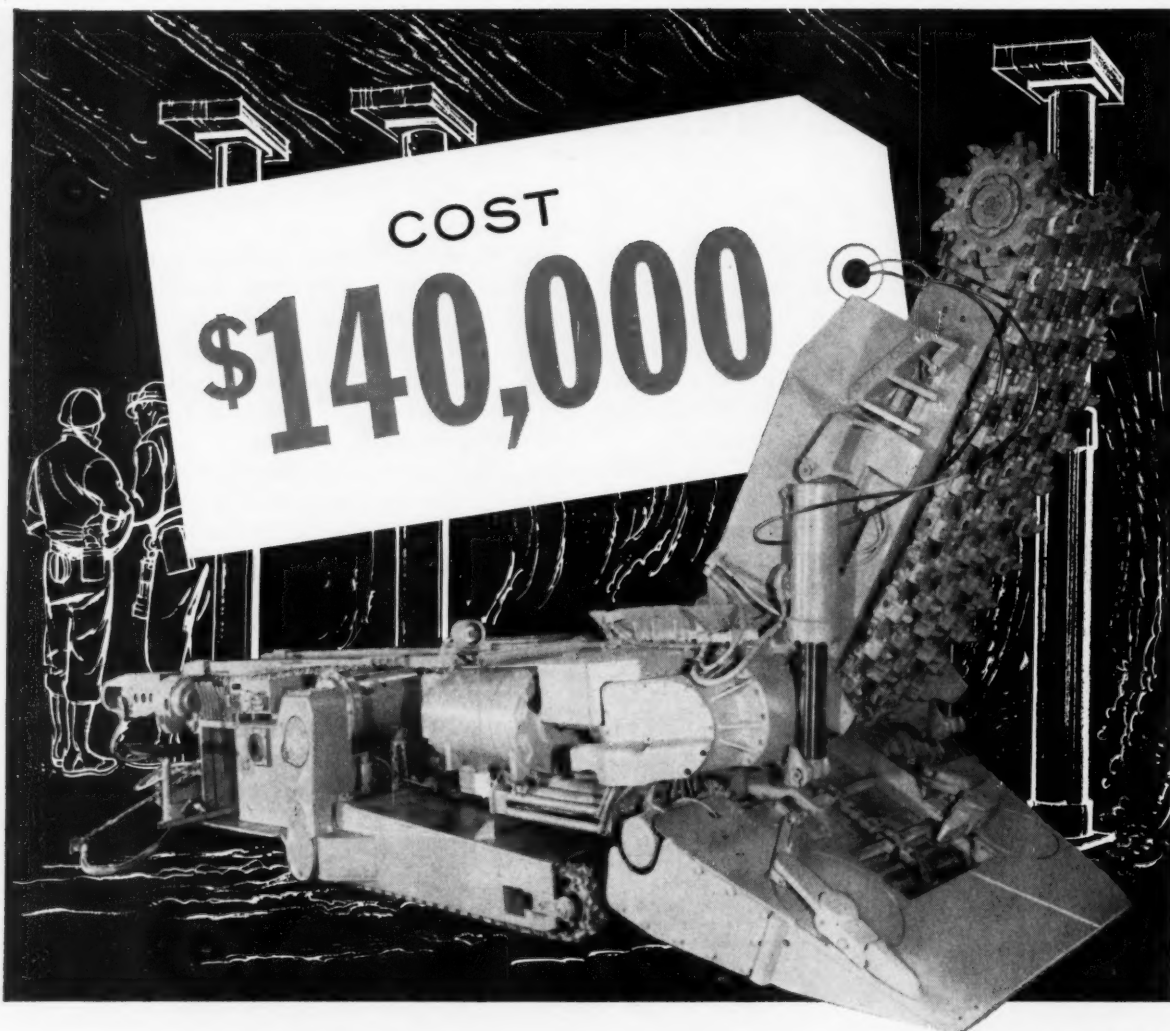


Photo courtesy Joy Mfg. Co.

Protect this \$140,000 investment with a Texaco "Stop Loss" Program

In 2 out of 3 mines, faulty lubrication practices are imposing a triple penalty on mine management. First, they take an unhealthy bite out of large capital investments in equipment by drastically shortening its potential life. Second, they skyrocket maintenance costs by multiplying the times the machine has to go to the shop. Finally—and most important—improper lubrication cuts tons-per-man rates by lowering equipment availability.

A Texaco "Stop Loss" Program can minimize these losses. Texaco's new program of organized lubrication can help save you money in practically every mine operation. It will certainly extend equipment life, raise your tons-per-man rate—and help you slash maintenance costs by at least 10 per cent.

How Texaco's Program works. Texaco's "Stop Loss" Program is primarily concerned with getting the right

lubricants into the right place at the right time. It involves an analysis of your requirements, the selection of the proper lubricants, and the training of your personnel in their application. *And it produces results.*

Ask your local Texaco Representative to prove what a "Stop Loss" Program can do for you. Contact the nearest of the more than 2,300 plants distributing Texaco Products or write to:

Texaco Inc., 135 East 42nd Street, New York 17, N. Y.

Tune In: Huntley-Brinkley Report,
Monday through Friday—NBC-TV

TEXACO

Throughout the United States

Canada • Latin America • West Africa



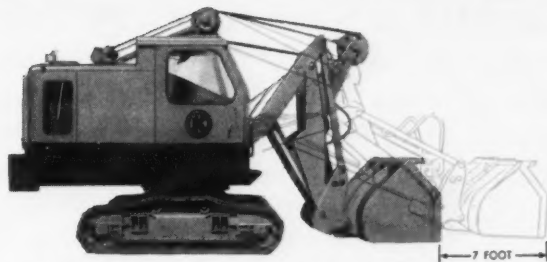


"SKOOPER Loads Cleaner Coal at Higher Speeds"

Says Atlee Mullet
President of Mullet Coal Co.
Mt. Eaton, Ohio

"Skooper has the speed and big capacity we need in our loading-out operations. And its flat, crowding action pulls away cleaner coal every time . . . clay and other material under the seam stays put. We used to use a 1½-yd. shovel. Skooper not only loads out faster but saves us money because of its high production and cleaner delivery of our product."

***There's Nothing Like It
On Wheels or Tracks***



Ask your Koehring distributor to show you what the Skooper can do to give you better coal-loading output. See him soon.

KOEHRING
DIVISION OF KOEHRING COMPANY
Milwaukee 16, Wisconsin

K119

IN SHUTTLE CARS JOY OFFERS 19 MODELS TO CHOOSE FROM

... you can select
the exact car to match
your seam conditions

With five* basic lines of modern shuttle cars, including AC, DC and diesel-driven cars, your Joy representative can assist you in selecting the *exact* machine to give you maximum production under your mining conditions. Machine heights range from the new 6-wheeled 18SC-7 at 24" high to the large capacity 15SC-1 measuring 57½" high. And every car has Joy's more than 24 years of shuttle car experience built into it. Have your Joy representative discuss the proper car for your application.

*Plus a complete line of special diesel and electric-driven shuttle cars for hard rock applications.

2578

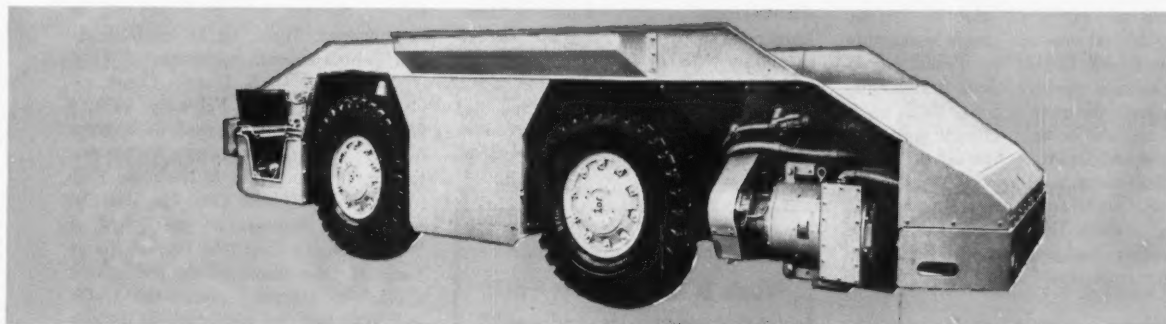
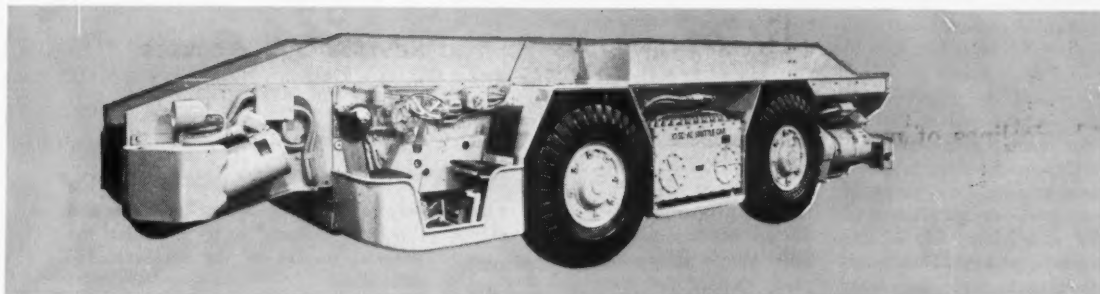
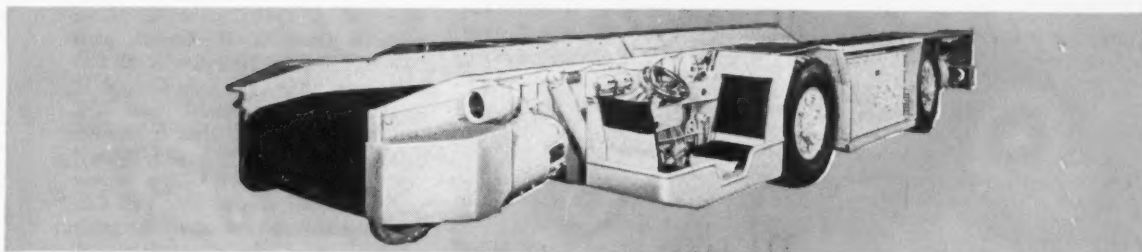
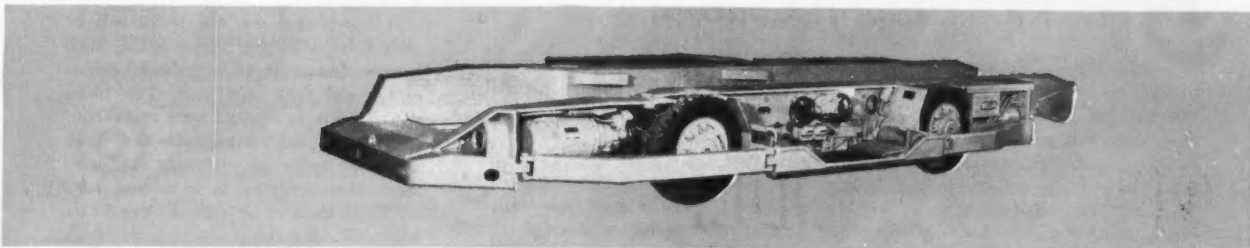
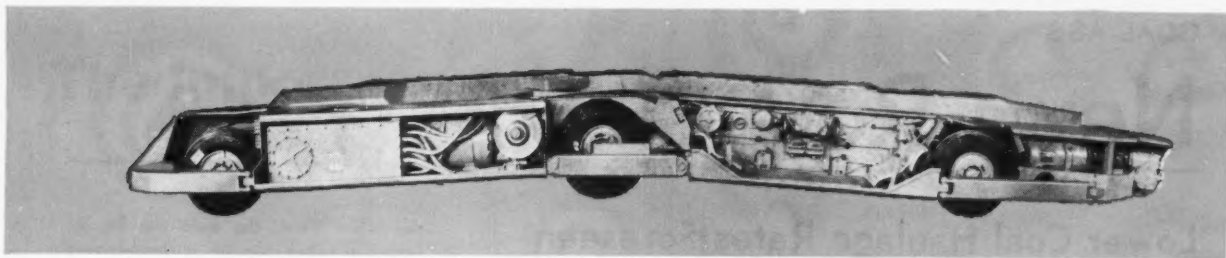
18SC-7 Only 24" high for seams as low as 30". The new 6-wheel design uses two center wheels for traction and the four corner wheels for steering. The load is spread over six wheels, giving the car amazing capacity and mobility. Capacity: 125 cu. ft. without sideboards. Other models of the 6-wheeled 18SC are available in heights of 27" to 40" and capacities up to 400 cu. ft.

8-SC A conventional four-wheeled car for low seams. The machine is only 26¼" high, yet has 5¼" of ground clearance for fast haulage over rough bottom. Carries a two ton payload. Available in 44" and 56" conveyor widths.

16SC-4 An extremely rugged car designed for heavy loads and steep grades in medium-low coal. With basic height of 33", has 130 cu. ft. capacity without sideboards. Two other models of the 16SC, one just 30½" high, have the same extra heavy wheel-drive units.

10SC-13 This 43" high unit is designed for high tonnage and difficult conditions in medium seams. Will tram fully loaded up a 15% grade. Five other models of the 10SC are available with heights ranging from 43" to 49", capacities up to 10 tons.

15SC-1 A true high tonnage car that hauls 15 tons in one load, the 15SC is specifically designed to make the most of high seam "high-ball" operations. The machine measures 57" high. Two 10 hp conveyor motors permit unloading at conveyor speeds suitable for belt or mine car haulage.



**WORLD'S LARGEST MANUFACTURER OF
UNDERGROUND MINING MACHINERY**

JOY

Joy Manufacturing Company
Oliver Building, Pittsburgh 22, Pa.

In Canada: Joy Manufacturing Company
(Canada) Limited, Galt, Ontario



News Roundup

Lower Coal Haulage Rates Foreseen In New RR Transport Concept

Record lows in delivered coal prices as well as additional headaches for oil and gas are expected to result from a new concept in mine-to-market transportation of bulk commodities using a radically new high-capacity freight train. The proposed bulk-hauling train would be an integral unit with semipermanent couplings and motive power at both ends as well as throughout the train.

The economic feasibility of this concept is to be studied by 35 railroads including all major Eastern roads. Initially the study will be applied to the transportation of coal to major bulk consumers, such as, electric utility generating stations and steel mills and to seaports for export.

Would Mean Lower Haulage Rates

The committee of railroad executives making the announcement, had this to say: "We are on the threshold of an important breakthrough in transportation which will benefit the public through lower rates for hauling many commodities basic to the consumer goods industries. The new concept leaps many of the barriers to maximum utilization of railroad plant and equipment, in line with a fundamental principle of railroad-ing, which matches increases in volume with steady improvement in efficiency.

"We expect to be able to achieve about 25,000 tons of a single commodity per trainload, double our present capacity, with a specially-designed integral train with the motive power built in. It will operate between distant points at high speed, holding promise of overall terminal-to-terminal speed unobtainable by any other form of bulk-commodity transportation. With special loading and unloading facilities, we will slash costs at the same time."

Here's How It Would Work

In applying the new plan to transporting coal, much time and money would be saved through eliminating the intermediate handling of cars at railroad classification yards. Present practice is to load each day's output into hopper cars at the mine, and move the cars to classification yards to be made up into trains for operation over the railroad. At destination terminals the cars are again re-

classified according to delivery points.

With the new technique, the coal requirements of a single customer would be accumulated in the mining area to provide a 25,000-ton load and shipped over the railroad in one uninterrupted operation. And the new type train will do that, the committee asserted. It will be scheduled to arrive at the loading point when the shipment is ready, load quickly, operate speedily over the railroad, stopping only to change crews, arrive directly at the destination terminal, unload, refuel and be serviced, and then be ready, in a matter of hours, to return to the same mine or proceed elsewhere for another load of coal.

In effect, the proposal applies to railroading the basic idea of the ocean bulk carrier. The vessel arrives in port to find its cargo waiting, loads it quickly, proceeds to its destination port, unloads and is ready for another cargo.

Trains Will Have A New Look

In appearance, the new train will be a departure from anything now known, the report stated. The cars will be of high capacity, especially designed to handle one commodity as efficiently as possible. They will be semipermanently coupled, so that the train will never be broken up. Diesel locomotive units, similar to those now in service on fast freight trains, will be used, but instead of pulling together from the front, they will be located at several points in the train among the cars. Their controls will be actuated in unison, from a control cab at one end to an identical cab at

the other. Thus, the train can be operated in either direction without having to be turned.

It is expected that the trains will be owned by a leasing organization, such as are thousands of piggyback, refrigerator and tank cars now. The trains will be able to operate over many connecting railroads throughout the entire continent under arrangements similar to those now applying to individual cars.

The committee of railroad executives who will make the study includes H. E. Simpson, board chairman, Baltimore & Ohio; W. J. Tuohy, president, Chesapeake & Ohio; W. H. Kendall, president, Louisville & Nashville; A. E. Perlman, president, New York Central; F. S. Hales, president, Nickel Plate; S. T. Saunders, president, Norfolk & Western; and A. J. Greenough, president, Pennsylvania. Theodore J. Kauffeld, a consulting engineering firm in New York City, has been named to conduct the study.

Revised Suit Accuses UMW of Attempted Market Control

The United Mine Workers Union has been accused of using "violence and threats of violence" to try to control the soft-coal market in the southern Appalachians.

This accusation is contained in a \$30 million damage suit filed July 12 in Chattanooga, Tenn., by 16 small southeast Tennessee coal operators.

The suit, in U. S. District Court, revised one (*Coal Age*, February, 1961, p 26) which originally named in addition to the UMW, the Tennessee Valley Authority, the Louisville & Nashville Railroad, West Kentucky Coal Co. and Cyrus Eaton, chairman of the board of West Kentucky Coal. On June 15 Judge Leslie R. Darr dismissed the action as it applied to everyone except the UMW and gave the coal operators 30 days in which to revise the suit accordingly.

The new complaint charges that a "conspiracy to force small coal mine operators to agree to a contract with the union began with a 1950 agreement between the UMW on one hand and big mining firms on the other, providing for Welfare Fund royalties on each ton of coal." At the present time, these royalties are set by the standard UMW contract at 40c per ton.

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The Importance of Balanced Compounding in Portable Cable Design

A portable cable is constantly under attack from many different directions. It is dragged over rough floor surfaces and rocky terrain, crushed under the wheels of trucks and carts, continually bent, flexed and stretched. In addition, it is very often subjected to attack by water, solvents, oil and ozone.

To give long, dependable service, portable cables must be able to withstand rough treatment, and must have built-in protection against all deteriorating factors. Moreover, they must possess other desirable qualities such as lightness and flexibility.

The science in designing these cables is to add the necessary ingredients in the jacket to provide maximum protection along with the maximum of other desirable features. This is where *Balanced Compounding* comes in. It is very easy to provide protection against one or two of the deteriorating factors, simply by loading the compound with an ingredient which is impervious or highly resistant to these factors. Unfortunately, however, the ingredients which provide resistance to abrasion or crushing may be highly susceptible to attack by oil or water; and vice versa.

The cable designer's problem, then, is to attain a balance in his compounding formula which will provide maximum protection against one deteriorating factor without reducing protection against others below the danger point.



To the buyer of cables, this means that *quantity* of any one ingredient is unimportant, unless it is considered in relation to the over-all ability of the cable jacket to resist *all* of the abuses to which it is subjected.


For balanced resistance to all these abuses, the best assurance you can get lies in the quality of the research and development facilities of the manufacturer, and the product's record of performance.

This is one reason why — in those

industries where portable cables are continually used or purchased as components of a manufactured product — Simplex Tirex Cables are regarded as the standard.

Proof of the worth of Tirex *Balanced Compounding*, which gives balanced resistance to all the deteriorating factors of normal use, can be found in the fact that Tirex cables have been successfully performing under the most rugged operating conditions for periods ranging up to twenty years.




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WIRE & CABLE CO.
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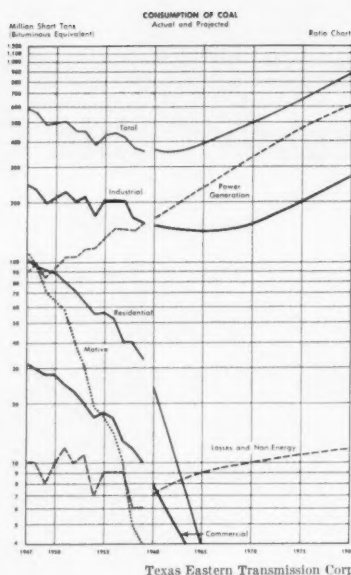
Bright Future For Coal Seen In Pipeline Co. Fuels Study

A rapid growth in coal consumption at the rate of 4.5% annually and an otherwise bright future for coal from the period 1960-1980 has been predicted by the Texas Eastern Transmission Corp. This prediction is contained in a detailed study "Energy and Fuels in the U. S. . . 1947-1980" just prepared by the pipeline company.

The study reveals that 20 yr from now the fossil fuels—gas, petroleum products and coal—will still be the prime energy suppliers for this nation.

The decline in direct use of coal, even in the industrial category, will be reversed after 1970. To supply the electric utility boiler fuel market, the study says, the use of coal will increase more rapidly than gas or oil between 1960-80. By 1980 coal is expected to account for some 77% of the fuels used in the conventional thermal generation of electricity. Gas will supply 16% and petroleum the remaining 7%.

Compared with a predicted annual growth rate for coal consumption of 4.5% between 1960-1980, the projected



rate for natural gas is 3.4% and for petroleum, 2.5%.

Texas Eastern foresees the generation of electricity by nuclear power becoming economically competitive with fossil fuels in only a few areas of the U. S. by 1980.

Hearings Held on Import Effects on Employment

Residual oil imports have a major, adverse impact on the U. S. coal industry, witnesses told a House Labor Subcommittee recently. The Subcommittee, under the Chairmanship of Rep. John H. Dent (D.-Pa.), held a two-day hearing June 19-20, the first of a series of hearings to consider the effects of exports and imports on domestic employment.

The lead-off witness for coal, G. Don Sullivan, associate director of NCA's Government Relations Dept., said that curtailment of residual oil imports, elimination of natural gas "dumping" and removal of restrictions on coal exports were essential to attainment of the industry's goal of 500 million tons annual production in the interest of national security. And he said residual oil is a "costly hitchhiker in the back seat of millions of American automobiles."

United Mine Workers president, Thomas Kennedy, testified that a huge influx of foreign fuels, mostly residual oil from Venezuela and natural gas from Canada, has hurt the coal industry. He estimated that 55 million tons of coal annually are displaced by imported residual oil. The present system of residual oil quotas must be maintained and even strengthened because the only other alternative is the degeneration of our domestic energy industries, he continued.

Joseph E. Moody, president, National

Coal Policy Conference, supported the testimony of Sullivan and Kennedy, calling residual imports at the present rate "unreasonable" and "excessive". He told the subcommittee, "There has been a shocking indifference to the plight of the domestic coal industry."

Representatives of the oil industry told the subcommittee that imports of residual fuel oil have no effect on employment in the coal industry. Joseph Lichtblau, research director of the Petroleum Industry Research Foundation, testified that a stiffening of controls on imported residual oil "would not make a dent in the coal industry's unemployment problems." Such restrictions would, however, he said, cause a loss of jobs in industries dependent upon residual fuel oil. He claimed that only six million tons of coal are directly in competition with residual oil.

The Humble Oil & Refining Co. maintained that the problems of the coal industry go far deeper than oil competition and that behind the picture of coal's decline is a case of changing laws.

Tennessee Gas Gets Second FPC Turndown

A Federal Power Commission presiding examiner again denied the application of Tennessee Gas Transmission Co. to import natural gas from Canada to New York State on an interruptible basis.

Tennessee applied for authorization to

import up to 204 million cu ft of gas per day from the facilities of Trans-Canada Pipe Lines, Ltd., at the international boundary near Niagara Falls, N. Y., where the two pipelines have an existing connection. Deliveries were to be on an interruptible basis at about 37c per mcf.

The examiner had denied a similar request last fall but the FPC reopened the proceedings to allow Tennessee to present additional evidence. The case now goes before the full commission.

The successful motion to dismiss the proposal was made by NCA, Fuels Research Council, Inc., UMWA, Anthracite Institute and the commission staff as being inconsistent with the public interest.

EG&FA Plans Second Plant

To process its medium-volatile metallurgical coal used in the manufacture of high-grade metallurgical coke, Eastern Gas & Fuel Associates will construct a new coal cleaning and preparation plant at its two Kopperston mines at Kopperston, Wyoming County, W. Va.

The new multi-million dollar facility, designed to further reduce ash content, will be capable of processing 11,000 tpd. Designed by Eastern's own Coal Preparation Dept., this plant will contain the most modern treatment facilities in use today—heavy media washer, Deister tables, froth flotation and thermal drying. General contractor is Roberts & Schaefer, Chicago.

The project, to be completed in the spring of 1962, represents the second major preparation plant to be built by Eastern this year.

Tampa Electric May Seek Additional Damages

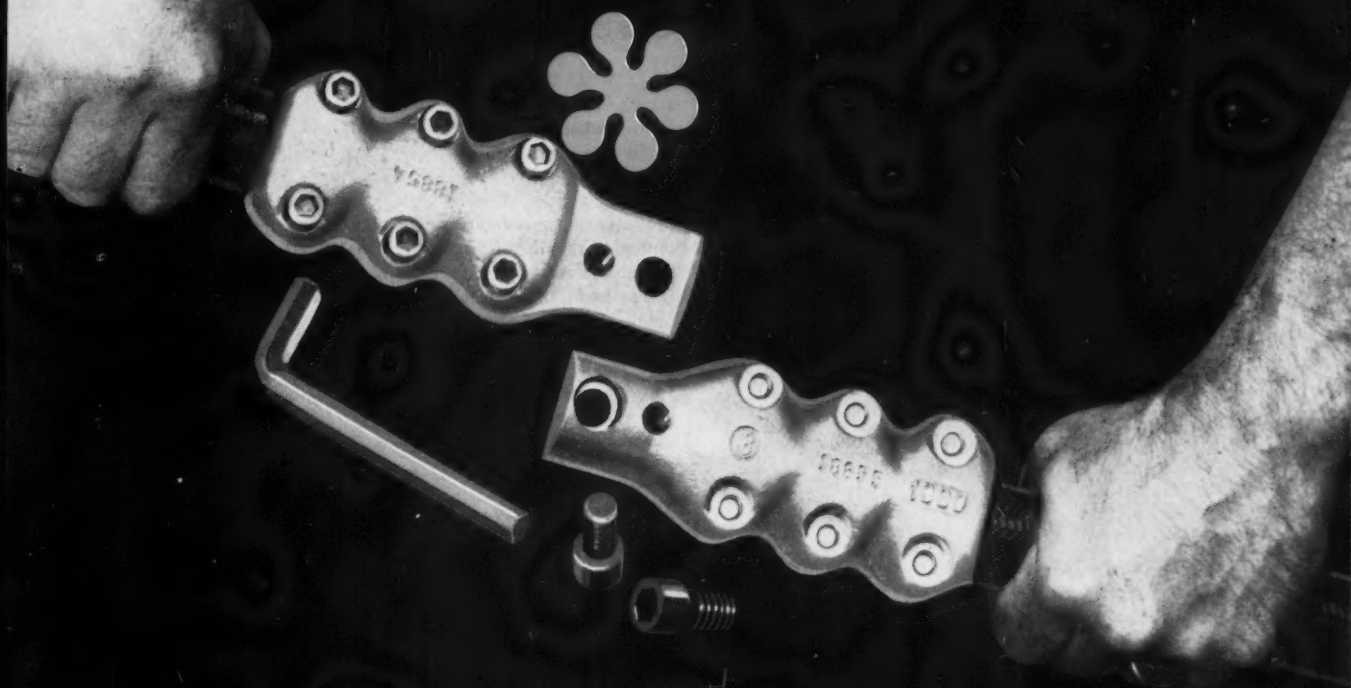
Tampa Electric Co., Tampa, Fla., may file an amendment asking for more than \$10 million damages in a federal suit pending settlement at Nashville, Tenn., over a coal contract, its attorneys indicated.

The company has asked for damages accrued from Sept. 1, 1958 to March 31 of this year of \$3,750,624, including 6% interest, for alleged breach of a 1955 contract. According to Tampa Electric attorneys, damages are accruing and will continue to accrue for the 17 remaining years of the contract. Therefore a flat sum of more than \$10 million may be asked to cover all damages, they noted.

This suit, which was initiated in federal court in Nashville nearly 4 yr ago, has been all the way to the U. S. Supreme Court which held the Tampa contract valid in a reversal of the lower courts and remanded the case to the district court for assessment of damages.

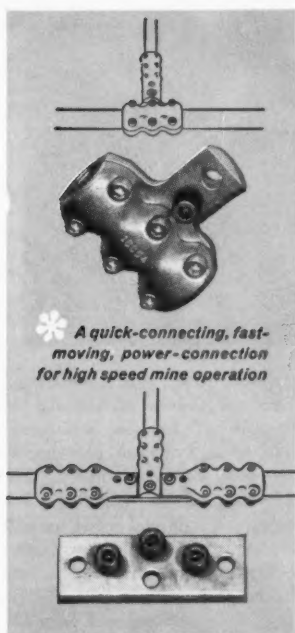
(Continued on p 38)

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People in Coal



Consol General Manager Given VP Post

CLEON R. FOWLER, in addition to his duties as general manager, has been given vice presidential responsibilities with Consolidation Coal Co.'s Pocahontas Fuel Co. Div.

His association with Consol dates back to 1940 when he joined Christopher Coal Co. as a production engineer after graduating from West Virginia University. In 1948 he was promoted to mine foreman and mine superintendent of Christopher's Arkwright No. 1, Osage No. 3 and Pursglove No. 15 mines. After that he served as general superintendent of the Osage and Pursglove mines until his transfer to the Pocahontas Fuel Co. Div. in July, 1960, as general manager of mines.

A past president of the Monongahela Valley Coal Mining Institute, Mr. Fowler is presently a member of the A.I.M.E. and West Virginia Coal Mining Institute.

Mr. Fowler, with his wife Mary and daughter Mary Jo, a student at West Virginia University, recently moved into their new home in Bluefield, W. Va. They formerly made their residence in Morgantown, W. Va., where their married son and his family still reside.

In addition to Mr. Fowler's appointment (above), two more promotions have been announced by the Pocahontas Fuel Co. Div. of Consol. **Alfred E. Copeland** moves up from assistant chief engineer to assistant to the president and **Charles W. Porterfield**, mechanical engineer, becomes assistant chief engineer.

On July 1 **James Hyslop** was chosen a vice president of Consolidation Coal Co. and will headquarter at St. Clairsville, Ohio. He had been president of Consol's Hanna Coal Div. since 1950. Before that he served as general manager, having joined Hanna in 1940.

Taking over Mr. Hyslop's former presidential duties is **James D. Reilly** who had been vice president since 1947. Mr. Reilly was first employed by Consol in 1942, became a mine superintendent at the Hanna division in 1945 and general manager of mines the following year.

Selected to head the Mining Div. of the Office of Coal Research is **Wayne A. McCurdy**, editor, *Mechanization*.

Dennis J. Keenan of Spangler, Pa., has been appointed a bituminous mine inspector to succeed the late **Clarence B. Lozaw**, inspector for the 11th Bituminous District. Mr. Keenan previously had served 13 yr as a State mine inspector in the 15th Bituminous District and from 1951 through May, 1960, was affiliated with Sterling Coal Co. He also

had served 13 terms as president of the Central Pennsylvania Safety Association and in 1951 was elected president of the Coal Mining Institute of America.



Virginia Polytechnic Institute has appointed **J. Richard Lucas** as head and professor of its Department of Mining Engineering. Professor Lucas replaces **Charles T. Holland** who has become dean, School of Mines, West Virginia University (*Coal Age*, June 1961, p 30). During the period since 1954 when he was in charge of mining engineering at Ohio State University, Professor Lucas also served the mining industry as a consultant in evaluation and analysis of mining properties and preparation plants.

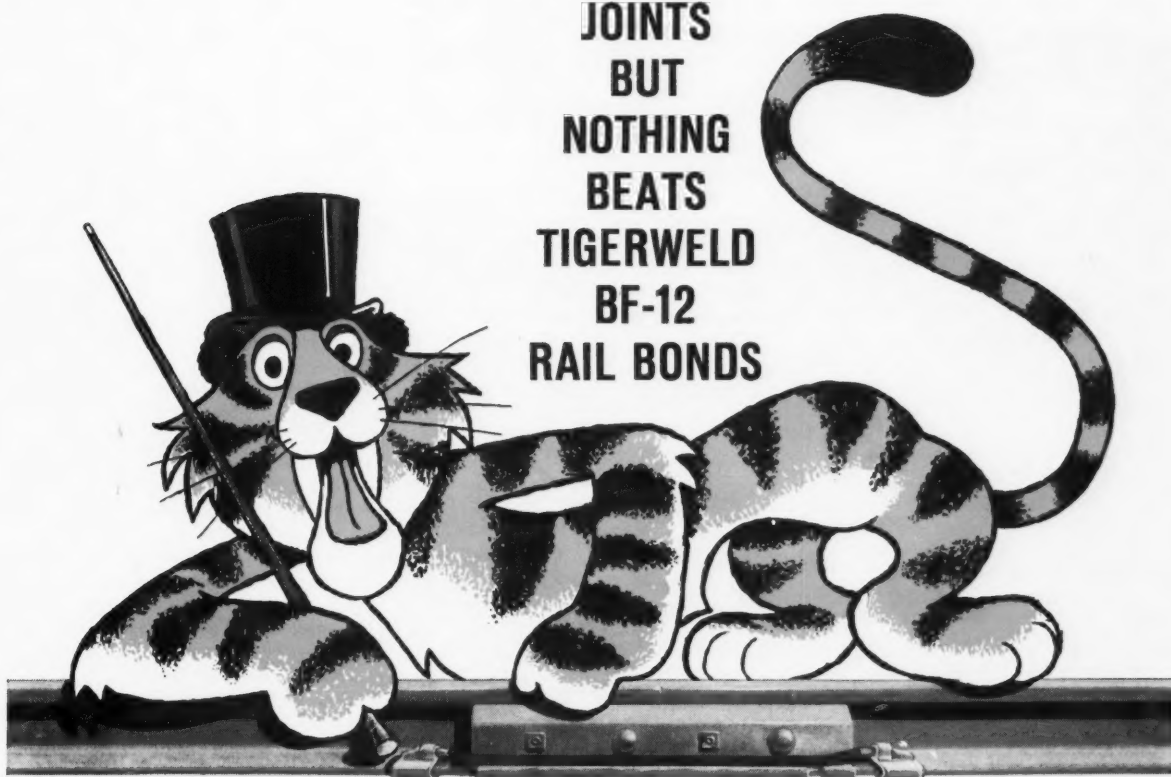
Previously employed as a field engineer for Joy Mfg. Co., his first mining job was with Crucible Steel Corp. He has authored many publications on preparation, mining, rock mechanics and acid mine drainage.



More V.P.I. news was made when **George Andrew Owens Jr.** copped the Old Timers award for the best senior mining engineering student planning to enter the coal mining industry. Mr. Owens, of Oakwood, Va., attended V.P.I. on the co-op program and made an outstanding record. He was also very active in extra-curricular activities and is employed by Island Creek Coal Co.

(Continued on p 43)

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British Coal Seeks Fuels Policy For Stability

Troubled British coal interests are now seeking a national fuels policy in an effort to secure the industry's position in the economy.

Early last month miners were warned that the industry was in danger of losing 12 million long tons of its annual sales because industrial firms were considering switching to oil. In a blunt speech at the National Union of Mineworkers' annual conference, National Coal Board Chairman Lord Robens pointed out that this potential loss represented the output of 50,000 men in 40 average-sized shifts, or two-thirds of the Scottish coalfields production. This estimate, he said, came from a reassessment made by the board's marketing experts in the light of last October's increase in coal prices which was only partially offset by the recently-imposed tax on fuel oil.

Lord Robens said competition could be met by ensuring price stability through long-term contracts, thus convincing customers that their fuel costs would remain steady. The key to stability, he said, was an increased rate of mechanization, up to a target of 80% power loading, combined with a sharp reduction in absenteeism and unofficial strikes.

Delegates passed a resolution saying the present industry crisis could be solved only by a national fuels policy and that only a labor government could give them a satisfactory policy.

Proposed Oil Tax Discourages German Refinery Plans

Plans to reintroduce the 4% turnover compensation tax on imported crude oil has, at least temporarily, discouraged seven oil companies from proceeding with plans to construct the Rhine-Danube pipeline and a new refinery. Some of these companies are considering construction of refineries in neighboring countries instead.

The oil concerns predict that this tax will open the German market to large imports of finished products, for instance, from the East Block which, when coming via Italy, are not subject to import quotas.

Coal is not satisfied with the government's plans either, although for different reasons. According to the chairman of the Ruhr Coal Mining Association, coal has recognized that it cannot compete with oil without government back-

ing. It feels that the oil companies are fighting for an expansion of their share in the energy market by all means without consideration for red-ink figures and Germany, as an unprotected market, seems to be the obvious outlet for the world's oil oversupply. Coal feels that the 4% turnover compensation tax on crude imports will prove equally inefficient to stop oil progress as the heating fuel tax introduced a year ago. The Ruhr mines, therefore, are agitating for import quotas on crude and heating fuel such as they are applied by the U. S.

U. S. Coal Men Face New Woes in Declining European Market

Faced with a slow decline in sales, American coal marketing agents are becoming increasingly concerned about eventual results of U. S. aid to Poland and of the energy policy of the six-nation European Common Market.

Though, at present, coal coming into the West European market from Poland is the kind that is converted to steam rather than the coking coal used in steel, there are large reserves of coking coal in Poland. It has been reported that an original aid plan started in 1946 has been revived and if, through U. S. aid, these reserves are developed, U. S. coal exporters will be unable to meet the competition and forced to shut their mines.

Hampton Roads, the Virginia port area from which more than 90% of U. S. coal is shipped, had an outbound volume of 51,000,000 tons in 1957; 34,000,000 in 1958; 23,000,000 in '59 and somewhat less in '60. Many factors enter into the reasons behind this decline. For example, Italy, which until last year was an excellent market for American coking coal, now is importing in increasing quantities German coal, one of the lowest-priced in Europe. Also, low-priced Russian coking coal is making headway here. Insofar as the Common Market countries are concerned, the trend has been to pinch U. S. exports in order to keep their own uneconomic coal mines going.

Another reason is the recent trend among European industries to switch to fuel oil. This cuts into sales of European coal producers and creates constant pressure in the European Coal and Steel Community for a ban on imports. One powerful argument on the American side is that European iron and steel products have a profitable market in the U. S.

Not to be overlooked is the Russian oil threat. Russia is pushing very hard to dominate the world fuel market, following a planned program to influence economically and then politically each country in which they can get a foothold in the fuel industry.

Overseas Flashes

AUSTRALIA—The discovery and proposed use of huge brown coal deposits in Victoria and preparation to considerably enlarge Australian coal exports will lead to some immense spending on equipment. It is expected that several million dollars will be spent in the near future on acquisition of equipment and machinery for the new plants and for coal handling and loading facilities. The deposits exceed 400 million long tons and will be used in the \$100 million aluminum project of Alcoa and its Australian partners.

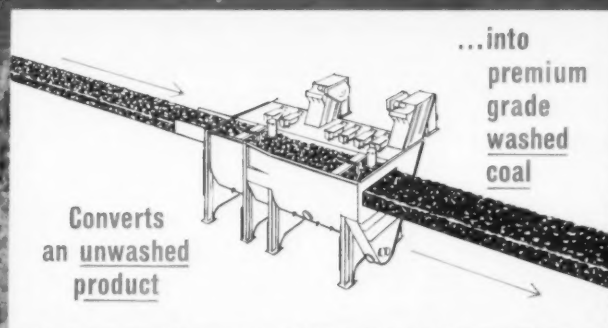
Contracts signed or negotiated with Japan for export of coal from New South Wales and Queensland will necessitate a large expenditure on further mine and transport facilities and loading facilities in ports. Federal authorities plan to subsidize, mostly indirectly, this forthcoming expenditure.

JAPAN—Japan's two leading steel producers said they have decided to reject some 200,000 tons of Communist Chinese coal unilaterally contracted by Japan's trading firms with Chinese authorities. The steel industry's tough attitude was the result of negotiations by three of the so-called "friendly trading firms" with Communist China in late May to buy Chinese coal at prices unacceptable to the steel industry. An informed source said the steel industry rejected Chinese coal not only because of the unacceptable price but also they didn't know what they were buying since Chinese coal is not washed. The two Japanese steelers are Yawata Iron & Steel and Fuji Iron & Steel.

SOUTH AFRICA—Research on the country's largest undeveloped coal field is underway to establish the coking properties of coal for use in Iscor's blast furnaces. Iscor, South Africa's state-owned Iron and Steel Corporation, is carrying out the research in collaboration with the Fuel Research Institute. Located in the Transvaal's Waterberg area, this coalfield has reserves estimated at 11 million tons of bituminous and 6 million of bright coal—used for coke preparation.

GREAT BRITAIN—Two 2,000 mw coal-fired power stations on the River Aire in Yorkshire—to be the largest in Britain—are planned by the Central Electricity Generating Board. Each station would burn up to five million long tons of coal a year, most of which would come from the Yorkshire coal field. These stations would provide an outlet for the small coal fractions which are unsuitable for domestic use and are thus piling up at the pithead.

Another McNally Pittsburgh Washing Plant



New McNally Pittsburgh Washing Plant Addition at the Glenbrook Mine of Stonega Coke & Coal Company

Gives customers the coal they want!

Today, as never before, more and more customers are demanding premium coal. Here at the Glenbrook Mine of Stonega Coke & Coal Company, Glenbrook, Kentucky, these demands are being met.

Glenbrook was originally a raw-coal plant, used chiefly for sizing. The forward-looking management recently installed a McNally Mogul Washer to upgrade its output and to give its customers the kind of coal they were looking for.

The McNally Mogul Washer receives 350 tph of 2" x 1/4" and 6" x 2" from the raw plant. The 6" x 1/4" middlings are reduced to 1" x 0 and recirculated to the washer. In the

washer, raw coal is automatically separated from the refuse, and the refuse is quickly and efficiently disposed of through existing conveyors to the refuse bin.

This Stonega plant is just one of many plants that are protecting their present markets and preparing for the future with McNally Pittsburgh coal preparation equipment. If you have a marketing problem, why not call in the Man from McNally Pittsburgh?

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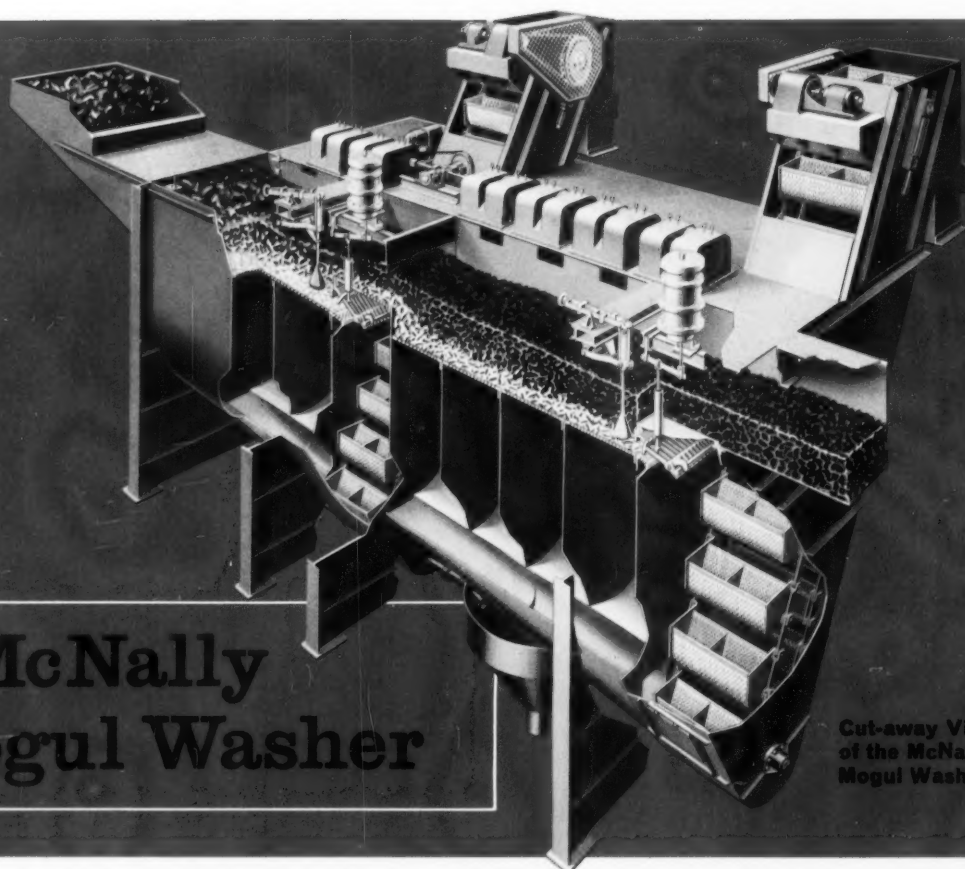
- | | |
|---|--|
| <input type="checkbox"/> Complete Coal Preparation Plants | <input type="checkbox"/> Coal Handling Equipment |
| <input type="checkbox"/> Coal Cleaning | <input type="checkbox"/> Crushers |
| <input type="checkbox"/> Thermal Dryers | <input type="checkbox"/> Automatic Samplers |
| <input type="checkbox"/> Centrifugal Dryers | <input type="checkbox"/> Coal Preparation Manual |
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The Mogul is a fully automatic washer in which the forward flow of coal and reject increases the capacity in the primary end of the washer. Each washing compartment, primary and secondary, separates its feed by hydraulic impulse into two strata. The upper stratum, consisting of coal and water, is discharged over the outer weir, while the heavier stratum bed travels to the evacuating gate. The bed is maintained at a selected depth by the float mechanism which varies the opening of the discharge gate to match the volume of rejects in the washer feed.

The evacuating gates are air operated. Hutch material

is removed by two sloping hutch troughs which are lined with stainless steel. Individual impulse valves, which are mounted on top of the air chest, control the compressed air to each cell and the exhaust. The washing impulse is regulated for each cell by adjusting the valve intake and exhaust ports, the air chest outlet to the valve, and the water delivery to the cell.

McNally Mogul Washers are equipped with heavy-duty elevators. The rugged elevator buckets are carried on two matched strands of manganese chain. Mogul washers are available with capacities up to 600 tph.

Your McNally representative will gladly give you further details on the Mogul washer. Ask him to call. Write or call any of the engineering and sales offices. McNally Pittsburg Manufacturing Corporation.

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Add to this the new "hoseless" M-style mast that gives you up to 40% more feed and greater usable thrust; the new power-gearred internal collection drill head; the husky rough service frame and you can see why the Fletcher Model DM ROOF DRILL is the newest, fastest, most dependable drill on the market today.

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Current Coal Patents

Oliver S. North
Patent Research and Abstracting
Washington, D. C.

Proportioning feeder for slurries, S. A. Stone and D. N. Griffin (assigned to The Deister Concentrator Co., Inc., Fort Wayne, Ind.), June 13, 1961. A proportioning feeder for distributing slurries of raw coal or other particular material to a screen consists of a head box having a weir and sets of chutes inclining downwardly in opposite angular relation to chutes of adjacent sets. No. 2,988,104.

Full size range centrifugal heavy media separation, G. B. Walker (assigned to American Zinc, Lead & Smelting Co., St. Louis, Mo.), June 13, 1961. In a "twin cleaning" method for effectively concentrating coal or other mineral values from a raw feed consisting of a wide range of particle sizes, a centrifuging step is utilized and the usual demagnetization step is eliminated. No. 2,988,212.

Material distributing device, J. de Koning (assigned to Stamicarbon N.V.,

Heerlen, Netherlands), June 13, 1961. A device for distributing lumps of raw coal, or coal and shale, to a screen or other type of apparatus comprises a body with a sloping plane and one or more guide blades to deliver the lumps successively in juxtaposition. The plane is inclined at an angle greater than the angle of repose of the material, and the guide blades are positioned so as to slide the material uniformly downwardly. U. S. 2,988,200.

Wedge operated anchoring means for mine roof bolt, J. B. Demspey (assigned to Pattin Mfg. Co., Inc., Marietta, Ohio), June 20, 1961. Improved mine roof bolt assembly of the shell and wedge nut type having improved anchoring means which eliminates the necessity of rigidly securing the shell sections to a connecting piece, such as the U-shaped strap heretofore utilized. Stop means are provided on the shell and the nut for preventing the nut from being pulled out of the shell. No. 2,988,950.

Cutter bit and holders and alignment means therefor, R. F. Prox Jr. (assigned

to Frank Prox Co., Inc., Terre Haute, Ind.), June 20, 1961. Design for a tapered cutter bit and cooperating holder in which the bit cutting edge can be accurately and positively aligned with a minimum of difficulty. Susceptibility of the shank of the bit to failure by bending and breaking is lessened. Screws, wedges, pins, or like fastening means are not used. No. 2,989,295.

Endless belt conveyor, S. C. Moon (assigned to The Jeffrey Mfg. Co., a corp. of Ohio), June 27, 1961. The tail end of this endless belt conveyor includes a mobile unit with means for guiding and supporting the belt at the tail end of the conveyor. The mobile unit is formed compactly and with a relatively narrow width to facilitate maneuverability in the mine. No. 2,990,051.

Mining method, M. A. Walsh, June 27, 1961. In the underground mining of coal or other minerals, the roof is supported by inflated flexible bags rather than by pillars, timbers, or the like. The bags are inflated with air at low pressure, e.g. 2 to 3 psi, and present bearing surfaces over wide areas of the roof and floor. To move the bags forward with an advancing face, they are partially deflated, towed to the advanced position, and re-inflated. No. 2,990,166.

Mining Apparatus, W. Meininghaus (assigned to Gewerkschaft Eisenhütte, Westfalia, Wethmar, Germany), June 27, 1961. Design for an improved bracing mechanism for a longitudinally extending mining conveyor of the double-chain scraper type. The conveyor is connected in holding engagement with each bracing beam through a piston cylinder arrangement that is parallel with the conveyor, so that upon actuation of the piston cylinder arrangement, the support stress on the bracing beams may be increased or relieved. No. 2,990,168.

Process and apparatus for separating mixtures of solid particles, J. N. J. Lee-man (assigned to Stamicarbon N.V., Heerlen, Netherlands), May 16, 1961. In the heavy-media concentration of raw coal or like materials, a method is provided whereby the concentrated suspension returned to the separating device contains a minimum amount of non-magnetizable particles, so as to maintain a high degree of accuracy of the separation. The dilute fraction recovered from the magnetic separator contains few non-magnetic particles and can be fed directly to the sprayers over the rinsing screens. The need for thickeners is eliminated. No. 2,984,355.



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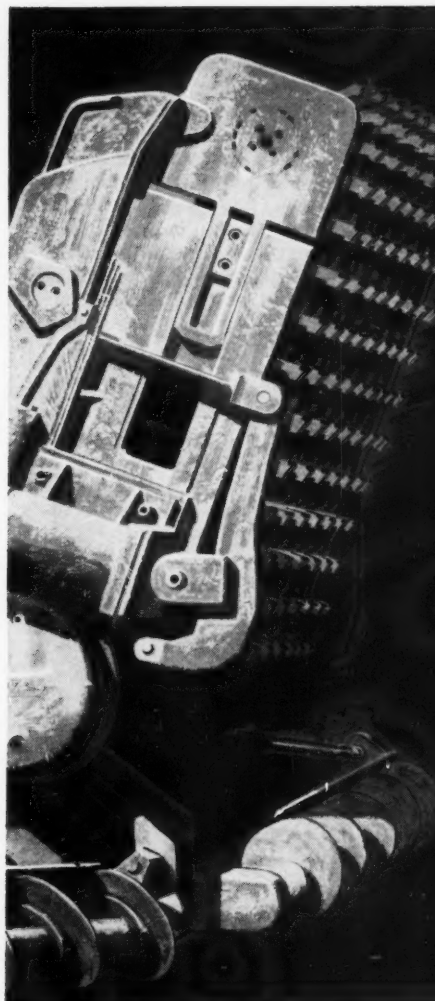
your CF&I Screen from many wire sizes, openings, weaves and crimps, selecting the one right screen that will give you more efficient screening and greater profits.

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bits cost you
more in lost tonnage!**



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Auger Bit—Tipped with the finest carbide made—for longer tool life . . . "V" prong for faster penetration. (Square and Hex shank.)



CC-8 STYLE

Machine Bit—Negative Rake, stronger cutting edge . . . tip, in compression, with greater support utilizes maximum carbide strength . . . fewer bit changes.

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When did you last buy a bit at a bargain? Did you really save? Probably not. "Bargain basement" bits have a real knack for costing you more than you save in the first place.

That's why you'll never find Carboloy mining bits "on sale in the bargain basement." Quality pays for itself over and over—and we refuse to sacrifice quality for the sake of a few extra "one-time" sales.

When you choose Carboloy mining bits for *your* operation, you'll get more tonnage per shift . . . the bits will last longer . . . and you get a *real* return on the money you've invested.

Your Authorized Carboloy Mining Tool Distributor has all the facts. And, there's a Carboloy engineer in your area to help you. Write: Metallurgical Products Department of General Electric Company, 11120 E. 8 Mile Street, Detroit 32, Michigan.

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MAGNETIC MATERIALS • THERMISTORS • THYRITE® • VACUUM-MELTED ALLOYS

(Continued from p 28)

Federal Judge William E. Miller has set a hearing for Oct. 16 on Tampa Electric's motion for award of damages and defendants' answer to and their motion on the damage.

Tampa Electric brought the now-historic suit against Nashville Coal Co.; Nashville Coal, Inc.; and West Kentucky Coal Co. Nashville Coal Co. was purchased by West Kentucky Coal and the subsequent Nashville Coal, Inc. was made a wholly-owned subsidiary of West Kentucky Coal. West Kentucky Coal took over the Tampa contract but refused to deliver the coal alleging the contract was illegal under the Clayton Act. It was then that Tampa Electric initiated the federal suit.

In a lengthy opinion, Supreme Court Justice Tom Clark concluded: "In weighing the various factors, we have decided that in the competitive bituminous coal marketing area involved here, the contract sued upon does not tend to foreclose a substantial volume of competition."

Work-Study Program Planned

Peabody Coal Co. plans to participate in a Cooperative Training Program which will enable a number of deserving sons of Peabody employees to attend one of the country's highly rated technical universities, the School of Mines and Metallurgy of the University of Missouri, Rolla, Mo.

Restricted to sons of Peabody employees, the program is designed for families who require financial assistance in meeting educational expenses. Under

this plan the student will get practical experience working in the company's mines as well as the formal training provided by the University. The company hopes to select two students who qualify to commence their training under this program this fall.

TVA Buys Kentucky Coal Reserves

For the first time in its 28-yr history, the Tennessee Valley Authority is buying coal in the ground to feed its big steam plants.

TVA has announced that it has exercised its option to buy coal mineral rights on 59,000 acres of coal land in southeastern Kentucky. The reserves were purchased to help assure an adequate long-range fuel supply for electric generating plants in the eastern part of the TVA system, according to general manager Louis J. Van Mol. Mr. Van Mol also announced that TVA has obtained an additional option for coal rights on 53,000 acres in northeastern Tennessee near La Follette.

To satisfy the present appetite of its coal-hungry steam plants, TVA invited coal producers to bid July 17 at Chattanooga, Tenn., on long-term contracts to supply 35,000 to 55,000 tons of coal per week for its eight major plants. This coal is to be delivered this month and in October.

This represents the second opening of long-term coal bids this year. A total of 16.5 million tons of coal was bought for \$47,939,613 through bids opened Feb. 14 at Chattanooga. Of this total 90% came from western Kentucky and more

than half was bought from the West Kentucky Coal Co.

Easy access to coal has been one of the factors enabling TVA to keep its power rates far below the national average. In a recent announcement, TVA set a fourth reduction in electric rates to a new national low. This new rate is designed to provide savings to customers using more than 250 kwhr of electricity a month. Under the new schedule, a downward sliding scale up to 900 kwhr is a "promotional rate" designed to encourage the use of electricity in homes.

Hanford Atom-Power Plan Killed in House

The House last month killed a proposal to add electrical generating facilities to a nuclear reactor under construction at Hanford, Wash.

By a teller vote of 176 to 140, the House adopted an amendment by Rep. James E. Van Zandt (R-Pa.) knocking the \$95 million power facilities out of the bill authorizing Atomic Energy Commission construction plans.

Prototype Transmission System Operates at Record 770 KV

General Electric Co. recently operated the full, 4½-mi length of their prototype transmission system, Project EHV (extra-high-voltage), at a record 770,000 V. This achievement toward higher voltages over longer distances should eventually mean much more power-plant

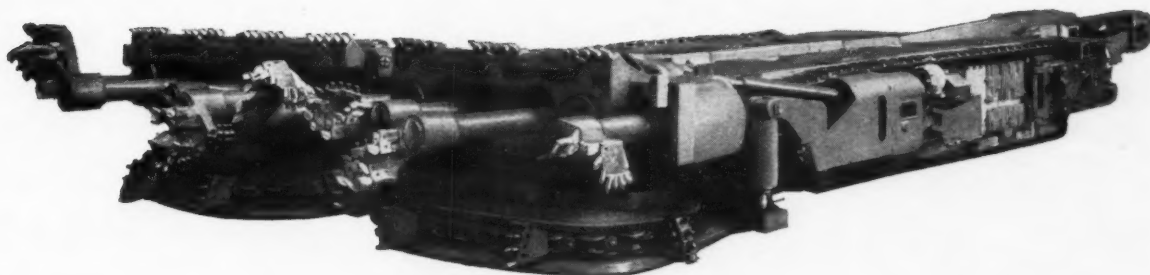


THE NATIONAL MINE RESCUE ASSOCIATION held its semi-annual meeting at the West Frankfort Country Club, West Frankfort, Ill., on June 3. Banquet speaker was H. E. Mauck (right), vice president in charge of operations, Freeman Coal Mining Corp., Chicago, Ill. Others who spoke at the meeting were Sanford Douglas (left), electrical engineer, U. S. Bureau of Mines, Vincennes, Ind.; Nat Kirk, assistant to the vice president, Snow Hill Coal Corp., Terre Haute, Ind.; E. E. Quenon, president of the post; and James Westfield, assistant director, U. S. Bureau of Mines, Washington, D. C.



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This powerful, compact Colmol advances with minimum maneuvering. Coal is broken from the face... not ripped or ground off. You get good overall screen consist, greater speed and efficiency. Colmol withstands the most severe mining conditions, operates with little noise or vibration.

All adjustments are hydraulic, can be made instantly and accurately. Easily accessible parts simplify adjustment and servicing. Safety features provide extra protection for both personnel and machine.

For low seams... or seams up to 8 feet high efficient, easy-going Jeffrey Colmols step up your production rate, cut operating and maintenance costs. Write for full details. The Jeffrey Manufacturing Company, 912 North Fourth Street, Columbus 16, Ohio.

If it's conveyed, processed or mined, it's a job for Jeffrey.



JEFFREY

construction at the mine mouth with resulting lower prices in electricity made from coal.

The half-mile north section of the Pittsfield, Mass., outdoor laboratory was energized last December at a new world mark of 720 kv. With conductors now strung the remaining 4 mi of the south section, the voltage reached 770 kv. This higher voltage was attained because of added capacitance which nullified a portion of the high inductive reactance in the supply circuit.

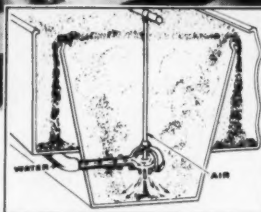
The record 770 kv was applied briefly to test the insulators, conductors and 18 different transmission towers at the proj-

ect. Continuous operation along the entire, open-ended line is now under way at 500 kv, chosen because this is considered the next voltage level for electric utilities planning EHV systems. After about a year at this level, the project's operating voltage will be raised to 750 kv.

According to project manager, Donnell D. MacCarthy, "Project EHV is designed to help electric utilities solve the numerous, complex problems involved in converting to extra-high-voltage transmission as a means to meet America's demand for more power at continued economical rates."



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Mines, Companies

All the remaining coal of the lower Kittanning or "B" seam beneath a 2,000-acre tract has been purchased by Barnes & Tucker Co. of Barnesboro, Pa. Purchase price of the tract located in Pennsylvania's Indiana and Cambria counties totaled \$131,729, from Manor Real Estate Co., and includes all mining rights.

Superior Pocahontas Mining Co., Inc. has bought the physical assets and leased the mining rights of the two mines at Capels and Havaco in McDowell County, W. Va. This lease involves about 80 million tons of low-volatile metallurgical coal. W. W. Wagner, executive vice president of Superior Pocahontas, said surveys would begin immediately and plans would be made for development of the mines. The mines were previously operated by the New River & Pocahontas Consolidated Coal Co.

Consolidation Coal Co. has taken a \$1 million lease from the Lorain Coal & Dock Co. for coal acreage in the area from Wolfhurst to the Aetnaville Mill lot in Bridgeport, Ohio.

According to company officials, plans for removing the coal are indefinite at the present time. It is estimated, however, that there is enough coal involved to mine 1,000 tpd for a 10-yr period.

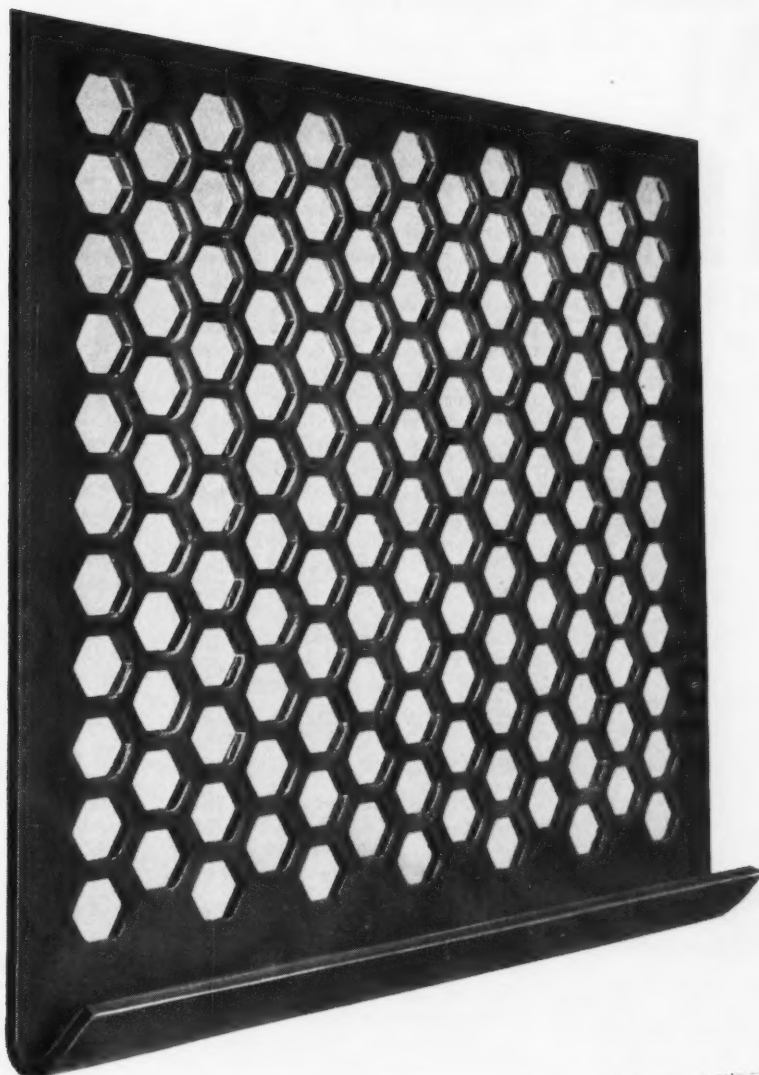
The reopening on July 10 of its Mine No. 22 at Pine Creek, Logan County, W. Va., has been announced by Island Creek Coal Co. It is initially scheduled for a daily production of 1,000 tons, and has permitted the recall of up to 70 men.

Utilization

Two more communities featuring all-electric homes are on the threshold of construction. The homes in both these communities will be awarded the nationally-coveted Gold Medallion emblem, hallmark of the highest quality and excellence in electrical design and equipment for the ultimate in living convenience and comfort. The electrical system design, as well as electrical apparatus and appliance specifications for these homes were developed by General Electric's representatives.

One community to be located in West Milford, N. J., around a 3-acre private lake, will consist of 240 homes offered in a variety of styles, priced from \$15,900 to \$19,900.

Charleston, W. Va. will be the site of the other community where 70 colonial-style homes costing \$28,000 to \$35,000 will be built. In this particular project a fallout shelter will be included.



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Hendrick quality steel perforated plate is made from high carbon or heat treated steels. It is available either flat or corrugated in any desired shape and with perforations of any size. Furnished with standard hook flanges for easy attachment to any vibrator. For more details, mail in the attached coupon today!



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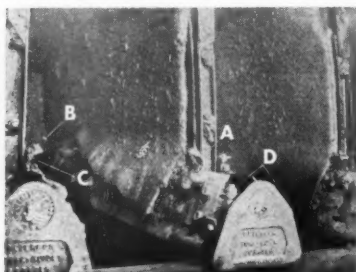
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Here are the reasons for these outstanding advantages. Guide surfaces are provided on the rim (A) and the heel (B) of the disc, aligning with the dual guides on the scrapers. These guides combined with the pin or hinge mounting in the rear of the scrapers (C) and the bar hinge in the front (D) allow the scrapers to follow any misalignment of the disc. Thus, a close, positive parallel setting is maintained at all times. Get the complete story on the "Dual Guide" Scrapers and the savings they can effect in your plant. Your present filter can be converted, or they are standard equipment on all Peterson Wire Cloth Filters. Write for Bulletin NO. D. G. - 104.

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Preparation Facilities

Pocahontas Fuel Co., Div. of Consolidation Coal Co., Itmann Mine, Itmann, W. Va.—Purchase authority issued to Daniels Co. for a DMS dense media precision coal washer installation, with primary unit designed to handle all raw feed over $\frac{3}{16}$ in. Completion May, 1961.

Turner Elkhorn Mining Co., Guaranty Tipple, Drift, Ky.—Contract closed with Wilferd L. Roller Co. for a complete heavy medium coal washer to clean 100 tph of $1\frac{1}{4} \times \frac{3}{4}$ Elkhorn stoker coal. Plant to be in operation Aug. 15, 1961.

Harry J. O'Brien Co., Pine Grove, Schuylkill County, Pa.—Contract closed with Deister Concentrator Co., Inc. for two SuperDuty Diagonal Deck No. 7 coal washing tables to handle No. 4 Buck anthracite.

U. S. Pipe & Foundry Co., Bessie Mine, Maben, Ala.—Contract closed with Deister Concentrator Co., Inc. for two Concenco "77" twin-deck, Diagonal Deck coal washing tables to handle 20x100 mesh fraction.

Virginia Iron, Coal & Coke Co., Toms Creek, Va.—Contract closed with Jeffrey Mfg. Co. for a 6-ft, two-compartment, 4-cell Baum Jig to handle 4x0 at 300 tph.

Bethlehem Mines Corp., Idamay, W. Va.—Contract closed with Peterson Filters & Engineering Co. for one "Dual Guide" disc filter, 8 ft 10 in dia by four discs, to filter about 13 tph of clean coal from froth flotation. Equipment sold to Roberts & Schaefer Co.

J. O. Lively Mfg. & Equipment Co., c/o New River Coal Co., Summerlee, W. Va.—Contract closed with Peterson Filters & Engineering Co. for one "Dual Guide" disc filter 8 ft 10 in dia by 12 discs, to filter 36 tph of clean coal from

cyclones. Equipment sold to Roberts & Schaefer Co.

Weirton Steel Co., Weirton, W. Va.—Contract closed with Eimco Corp. for a 60-ft thickener and 8 ft 10 in x 9 disc agidisc filter to handle 5 tph of coal refuse in 250 gpm. The engineering has been done by A. E. Stillson & Associates, Columbus, Ohio.

Bethlehem Mines Corp., Century Mine, Century, W. Va.—Contract closed with McNally Pittsburg Mfg. Corp. for modernization of existing preparation plant involving r-o-m crushing at 210 tph, Lo-Flo Dense Media Bath to process 135 tph of 5x $\frac{3}{4}$. Froth flotation addition to treat effluent from existing equipment. Completion, Dec., 1961.

Pittsburg & Midway Coal Mining Co., Gallup, N.M.—Contract closed with McNally Pittsburg Mfg. Corp. for raw coal preparation plant involving crushing and screening with future capacity of 1,000 tph. Raw coal facility has two loading tracks equipped with McNally Pittsburg car handling system. Completion, Dec., 1961.

Bituminous Output

YEAR TO DATE	PRODUCTION
July 15, 1961	196,355,000
July 16, 1960	224,412,000
1961 output 12.5% behind 1960.	

WEEK ENDING	PRODUCTION
July 15, 1961	7,440,000
July 16, 1960	7,389,000

Anthracite Output

YEAR TO DATE	PRODUCTION
July 15, 1961	9,455,000
July 16, 1960	9,592,000
1961 output 1.4% behind 1960.	

WEEK ENDING	PRODUCTION
July 15, 1961	347,000
July 16, 1960	354,000

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EXPLORATION FOR MINERAL DEPOSITS
INCLUDING URANIUM & LIMESTONE — ANYWHERE

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and accessory equipment maintained at all times

Core Drill Contractors for more than 60 years

JOY MANUFACTURING CO.
Contract Core Drill Division
MICHIGAN CITY, INDIANA

(People, Cont'd from p 30)

The U. S. Department of the Interior recently has chosen chiefs for three divisions of the Department's Office of Coal Research. **Bernard S. Beckler**, a Department employee since 1951 and a career employee of the Federal Government since 1940, will head the division of economics and marketing. Currently teaching economics at American University, Mr. Beckler is completing his Ph. D. work at that University. New chief for the division of utilization is **Neal P. Cochran** who has been associated with the U. S. Army Chemical Corps for the past 10 yr in positions of increasing responsibility. A staff official of the Department's Office of the Secretary, **G. Edward Larson** will head the division of contracts and administration.

Obituaries

R. M. Davis, coal operator, philanthropist and world peace advocate, died June 26 of an apparent heart attack while attending the funeral of a sister-in-law. He was 79 yr old. A long-time resident of Morgantown, W. Va., he was active in the coal industry for 41 yr until his retirement in 1956. Mr. Davis had controlling interest in the Davis Wilson Co., Bunker Coal Co., Chaplain Collieries Coal Co. and in other concerns.

John J. Foster, 72, passed away suddenly July 15 after suffering a heart attack. He had just retired last February as vice president, public and industrial relations for Island Creek Coal Co. Well known throughout West Virginia and the industry, he had been associated with Island Creek for more than 50 yr.

Associations

At its 53rd annual meeting, the **Alabama Mining Institute** reelected **W. H. Parker** president and **H. P. Sibert** secretary-treasurer and traffic manager. All members of the board of governors were reelected except **Dr. Milton H. Fies**. Dr. Fies, retired vice president of Alabama Power Co., is succeeded on the board by **H. Neely Henry**, senior vice president of Alabama Power Co.

The Southeast Section of AIME, under the leadership of **J. W. Nicol**, section chairman, is making concrete plans to establish a metallurgical division to function for the present within the ranks of the Southeast Section. This is a cooperative venture and has the full support of the local leaders in both the mining and metallurgical fields. The coming fall meetings will have a predominately metallurgical slant to stimulate interest within the metallurgical group. This will

be the first such section to be organized.

John V. Beall is the new editorial director of the **Society of Mining Engineers of the AIME**. The Society, which is the professional organization in the U.S. for engineers and geologists in the mineral industries, publishes the monthly magazine *Mining Engineering*, the official *Transactions* and other technical works. Mr. Beall has had an extensive career in mining engineering and, in a previous association with the AIME, was publications manager for the Institute's mining and metals branches.

The annual election of Central Ad-

visory Council officers and members of the executive committee of the **ME-MMA** took place June 9 in the Mountain View Hotel, Greensburg, Pa. Elected as president was **Harry J. Young**, Sales representative, Cooke-Wilson Electric Supply Co.; first vice president, **Adam V. Sypneski**, maintenance engineer, Rochester & Pittsburgh Coal Co.; second vice president, **Howard W. Davies**, sales representative, Anaconda Wire & Cable Co.; and third vice president, **Walter E. Keally**, sales representative, American Steel & Wire Div., U. S. Steel.

Two new branches of the ME-MMA,

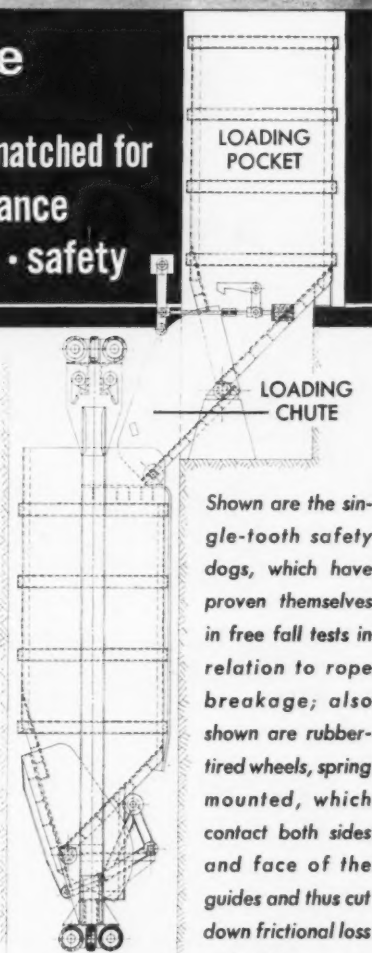
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Each Skip is custom-built to your requirements . . . the skips mechanically open the loading chutes; the skips are filled and in turn, the departing skip closes the loading chute, toggle locking. Since the skip is of the fixed hopper type, both the bail and the lateral construction of the skip aid in maintaining its shape and structure. Write for information today on how you can increase the efficiency of your hoisting operation.

Shown are the single-tooth safety dogs, which have proven themselves in free fall tests in relation to rope breakage; also shown are rubber-tired wheels, spring mounted, which contact both sides and face of the guides and thus cut down frictional loss and guide wear.

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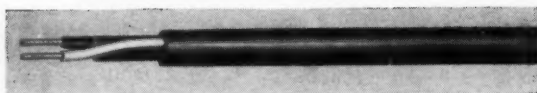
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CONNELLVILLE, PENNSYLVANIA



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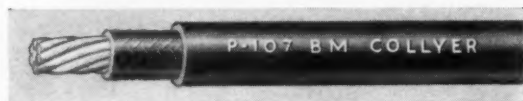


Remote Control and Drill Cords

PORTABLE CORDS...

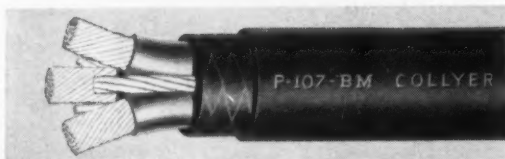


Portable Power Cable, Twin Type G (Hex-Shaped Parallel Conductors)

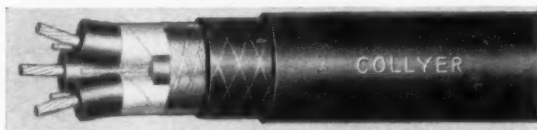


Locomotive Gathering Cable

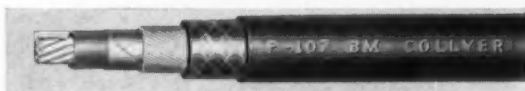
...AND CABLES



Portable Power Cable 2-4 Conductor Type G 2-6 Conductor Type W



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both in eastern Ohio, were organized last April. The **General Custer Branch** located at Cadiz started off with a membership of 10 at the April 1 organization meeting and grew to 202 by the June meeting. It was named after General George Armstrong Custer, the gallant leader of the ill-fated "Custer's Last Stand", who was born at New Rumley, a small hamlet about 10 airline miles north of Cadiz. The second is the **Tusco Branch** located at Midvale. The Ohio Valley Branch was instrumental in starting the two new groups.

Coming Meetings

International Briquetting Association Conference, Aug. 28-30, 1961—Jackson Lake Lodge, Jackson, Wyo.

Annual Meeting, ME-MMA, Sept. 30, 1961—Mountain View Hotel, Greensburg, Pa.

National First-Aid and Mine-Rescue Contest, Oct. 2-4, 1961—Civic Center, Charleston, W. Va.

Southern Research Institute, Coal Technology Conference, Oct. 3-4, 1961—Dinkler-Tutwiler Hotel, Birmingham, Ala.

Joint Solid Fuels Conference, AIME-ASME, Oct. 5-6, 1961—Dinkler-Tutwiler Hotel, Birmingham, Ala.

National Safety Congress, Oct. 16-20, 1961—Conrad-Hilton Hotel, Chicago, Ill.

Illinois Mining Institute, Oct. 20, 1961—Hotel Abraham Lincoln, Springfield, Ill.

West Virginia Coal Mining Institute, Central Appalachian Section, AIME, Nov. 3-4, 1961—Greenbrier Hotel, White Sulphur Springs, W. Va.

Kentucky Mining Institute, Nov. 9-10, 1961—Phoenix Hotel, Lexington, Ky.

Coal Division Conference, American Mining Congress, Nov. 17, 1961—Penn-Sheraton Hotel, Pittsburgh, Pa. Coal Division Committee Meetings:

Aug. 22, Coal Prep.; Aug. 23, Power; Brown Hotel, Louisville, Ky.

Aug. 25, Strip; McCurdy Hotel, Evansville, Ind.

Aug. 31, Safety; Sept. 1, Research; Sheraton Park, Washington, D. C.

Coal Mining Institute of America, 75th Annual Meeting, Dec. 14-15, 1961—Penn-Sheraton Hotel Pittsburgh, Pa.

Equipment Approvals

Dooley Brothers — Model X-8900 dual-arm roof drill with integral dust-collecting system; four motors, two 6.7-hp and two 7.5-hp, 250-V, DC. Approvals 2F-1652; 25B-88, June 2.

Gardner-Denver Co. — Model JRB roof-bolting machine; four motors, one 75-hp, two 25-hp and one 10-hp, 250-V, DC. Approval 2F-1653, June 6.

U. S. Bureau of Mines, Health and Safety Research and Testing Center, Ventilation Group—Types M-1 and M-2, 12-V, DC, self-contained air velocity monitors. Approval 2F-1654, June 12.

Long-Airdox Co. — Type TDF-15A face drill; one motor, 15-hp, 220-/440-V, AC. Approvals 2F-1655 and 2F-1655A, June 15.

Joy Mfg. Co. — Type 25HRI-1E loading machine; seven motors, two 25-hp, two 15-hp, two 10-hp and one 4-hp, 250-V, DC. Approval 2F-1656, June 19.

Joy Mfg. Co.—Model I-21 axivane fan; one motor, 5-hp, 550-V, DC. Approval 2F-1657A, June 19.

Goodman Mfg. Co.—Type 967C tractor-tread loading machine; four motors, each 26-hp, 220-V, AC. Approval 2F-1488, June 23. Approval 2F-1488A covering the 440-V, AC, Type 967C loader was issued to Goodman Mfg. Co. Aug. 10, 1959.

Jeffrey Mfg. Co. — Type ML-97 crawler loader; seven motors, four 30-hp, two 30-/7.5-hp and one 8-hp, 440-V, AC. Approval 2F-1658A, June 26.

Columbus-McKinnon Chain Corp. —Model RF-57-L ratio feeder; two motors, each 20-hp, 240-V, DC. Approval 2F-1659, June 28.

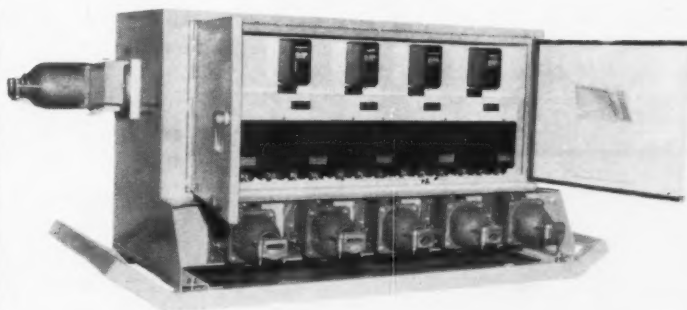
Goodman Mfg. Co.—Type 964B loading machine; four motors, each 21-hp, 250-V, DC. Approval 2F-1660, June 28.

Galis Electric & Machine Co.—Model 310 rotary roof drill with integral dust-collecting system; one motor, 20-hp, 250-/550-V, DC. Approvals 2F-1661/2F-1661A and 25B-92, June 29.

Galis Electric & Machine Co.—Model 400 face drill; one motor, 20-hp, 250-/550-V, DC. Approvals 2F-1662 and 2F-1662A, June 30.

Goodman Mfg. Co.—Type 967-LC tractor-tread loading machine; four motors, each 20-hp, 440-V, AC. Approval 2F-1663A, June 30.

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Panel is dead front construction.

Each plug is electrically interlocked with its respective breaker.

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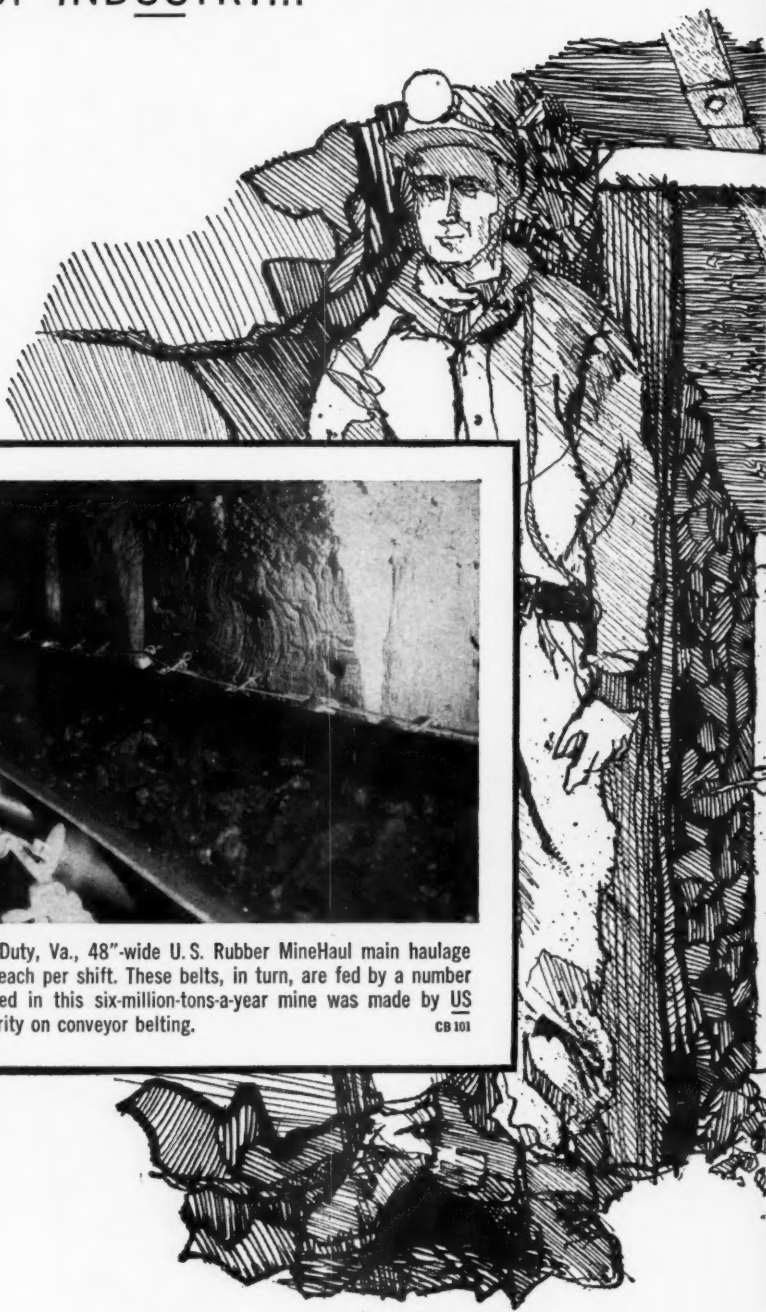


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Serving the famed Moss #3 Mine of Clinchfield Coal, Duty, Va., 48"-wide U.S. Rubber MineHaul main haulage belts, each more than a half a mile long, carry 3,000 tons each per shift. These belts, in turn, are fed by a number of 36" panel belts. The fact that most of the belting used in this six-million-tons-a-year mine was made by US reflects U.S. Rubber's position as the world's leading authority on conveyor belting.

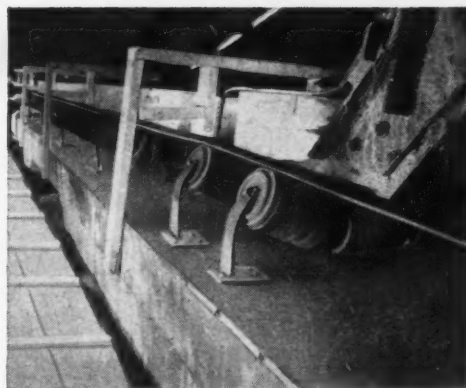
CB 101

At the heart of the coal mining industry, you'll find US ... with the industrial rubber products that provide "minimum mining maintenance." See how and why U.S. Rubber products serve you better, cost you less, throughout your entire mining operation.



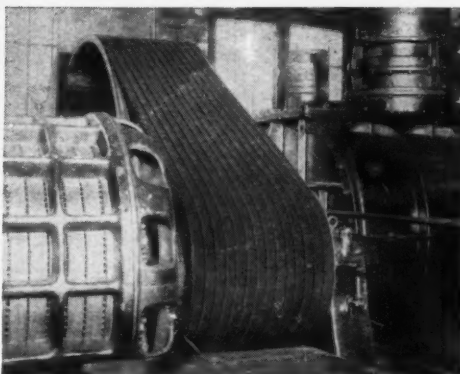
Long after other hose have failed from the cuts, abrasion, and abuse of heavy-duty work, U. S. Matchless® Air Hose can be seen powering equipment at mining and construction sites everywhere. Its unique ability to withstand the toughest treatment is but one reason why U. S. Rubber is the largest producer of hose in the world, with a complete line of hose for every industrial need.

H 101



Dramatically reducing maintenance and downtime for conveyor belt installations everywhere, patented U. S. Searle Sleeves protect rollers against impact damage, corrosion, build-up of wet muck, fines, and abrasive dusts. Belt wander is eliminated, edge wear greatly reduced, troughing substantially improved. Both belt and idler rollers wear far longer.

SS 101



Cut costs, reduce maintenance, avoid shutdowns. In mines across the country, U. S. Royal V-Belts power fans, pumps, compressors, generators, conveyors—equipment that demands the maximum in reliability for safety as well as profit. U. S. Royal V-Belts are known throughout industry for their exceptional length stability, uniformity, and long service on drives of all kinds and sizes.

VB 101

For every industrial rubber product need, turn to **U.S.** For Conveyor Belts, V-Belts, the original PowerGrip "Timing"® Belt, Flexible Couplings, Mountings, Fenders, Hose and Packings . . . custom-designed rubber products of every de-

scription. Discover why U. S. Rubber has become the largest developer and producer of industrial rubber products in the world. See your U. S. Rubber Distributor or contact **U.S.** directly at Rockefeller Center, New York 20, N. Y.

WORLD'S LARGEST MANUFACTURER
OF INDUSTRIAL RUBBER PRODUCTS



United States Rubber

MECHANICAL GOODS DIVISION



Hooking up the holes proceeds without danger of premature detonation from stray electric currents.



Delay connectors are attached to Primacord downlines; LEDC trunklines are cut and crimped into these connectors.



The dual connections are taped securely together and the ends of the Primacord downlines are tied.

ENSIGN-BICKFORD LEDC helps solve blasting noise problems at General Crushed Stone Quarry

The Glen Mills Quarry of the General Crushed Stone Company at Glen Mills, Pa., is located in the heart of a residential area. *And its neighbors don't like noise!*

The quarry produces aggregate from hard granite gneiss, very blocky and seamy. High explosives are used with Primacord® downlines for in-hole initiation. These downlines are hooked into a surface system of LEDC trunklines and Delay Connectors.

Danger of Prematures Minimized

Blasts are set off at a specified time each day. This means that loaded holes may stand for several hours before blast time. To minimize danger from stray electric currents, the electric blasting caps are never attached until the last minute.

The use of trunklines of Ensign-Bickford Low Energy Detonating Cord has practically eliminated the noise problem—and without danger of premature shots from stray currents.

This blast was set off on December 6, 1960. It consisted of eight 7-in., 50-ft. holes at 15-ft. intervals in a line 20 feet back of the base of a 46-ft. face. Loading was under the direction of Harry Kemery, Superintendent, and Morton McGuirk, General Quarry Foreman. High explosives were used with two primers in each hole, initiated by Plastic Wire Countered Primacord downlines.

A continuous line of LEDC was laid from Hole No. 8 to Hole No. 1 and back again, forming two trunklines. Delay Connectors were attached to each downline, and the trunklines were cut and crimped into the Connectors, which were then taped securely together.



Two Electric Blasting Caps were taped onto the Primacord downlines at No. 1 Hole, which fired instantaneously. Succeeding holes were progressively delayed 15 milliseconds.

Noise was no problem!...just the normal thud of explosives breaking rock.

Ensign-Bickford LEDC is a Low Energy Detonating Cord with two grains PETN per foot, encased in a lead tube and protected by a plastic jacket. It detonates throughout its entire length at nearly four miles per second, but detonation noise is *low*. 150 feet of LEDC makes no more noise than a single blasting cap!

LEDC will not directly initiate Primacord or other cap-sensitive explosives. It is used with connectors developed by E. I. du Pont de Nemours & Co., Inc. LEDC is made only by Ensign-Bickford. Both are available through all explosives manufacturers.



If you have blasting noise problems, LEDC may be the answer. Write for free bulletin; also a free copy of the new Primacord catalog and manual is available through your explosives manufacturer—or write giving your company name.

THE ENSIGN-BICKFORD COMPANY
Simsbury, Connecticut • Since 1836

EB

Devoted to the Operating, Technical and Business Problems of
The Coal-Mining Industry



AUGUST, 1961

IVAN A. GIVEN, EDITOR

One of the Finest

THE EVOLUTION in coal transportation, which in fact is verging on revolution, promises benefits which still are difficult to comprehend in their entirety. The evolution involves not only movement of coal as a solid but also over wires as electricity. Now, the eastern railroads have tossed their collective hat into the ring with the announcement of plans to develop special trains with a capacity of 25,000 tons of coal for use between field sources and bulk users, such as, steel mills and power plants. For details, see the report in the News Roundup in this issue.

Significance? New lows in delivered prices in the near future and additional hurdles for oil and gas. If the competition should be direct, as in firing a utility, coal will have the growing advantage of lower costs to the consumer compounded of low mine prices and reduced transportation. For oil and gas the trend for both is up. If the energy is delivered by wire, as envisioned in the high-voltage experiments now going on, the power plants will be built in the coal fields of the East and South, closest to the industrial and population concentrations of the country, and not double and triple the distance away in the oil and gas country of the Gulf Coast and the Southwest.

The revolution in mine-to-market transportation could well be one of the finest breaks in history for coal.

Key Ingredient

AGREEMENT that there is growth ahead for bituminous coal is now almost universal, though not all companies and areas will experience it at the same rate—and in the nature of things some will lose. But there is growth in the industry's future as an industry. The big question is: "How much

growth?" An equally big one also: "How can the maximum in growth possibilities be realized?"

Since growth is assured, the second question becomes, in fact, the biggest one of all. And, as always, a key ingredient in the answer is management philosophy and skill. Many books have been addressed to this subject, but it still is in order to note that the most-effective management is that management which neglects no facet of the overall problem. In other words it is not production-minded nor, by the same token, sales-minded. It gives the proper weight to both—and to all other factors involved in convincing the buyer, whether actual or prospective, that coal is the best from all standpoints.

And with appreciation of all the elements in a complete managerial job must also come skill derived from both study and practice. A hard look at itself and its approach to the problems of its corporation and its industry should be management's first step in getting ready to get the most out of the growth prospects of the future.

Work Simplification

MOST PEOPLE feel that the way they do their work is the most-efficient way. But is the job for which you are responsible being done in the most-efficient manner? The chances are to the contrary, and in any event there should be a pause once in a while to check up. One rule is that the simplest method of performing a job usually is the most-efficient, whether it is setting a roof-bolt, making a cut with a bulldozer, or mapping out a supply-handling and delivery system. The opportunities in this direction have, in fact, resulted in the development of the art of work simplification. It is another tool that can be employed to get maximum results from manpower and machines and thus cut cost. Coal companies that have had their management group trained in work simplification can vouch that the results are most worthwhile.



STRIPPING GIANT removes overburden in 65-cu yd bites. Pit width ranges from 65 to 120 ft, depending on topography.



A 70-TON PAYLOAD is carried by the truck at the loading shovel. Three 50-ton trucks round out the haulage fleet.

Sunnyhill No. 9: Ohio's Newest Big Producer

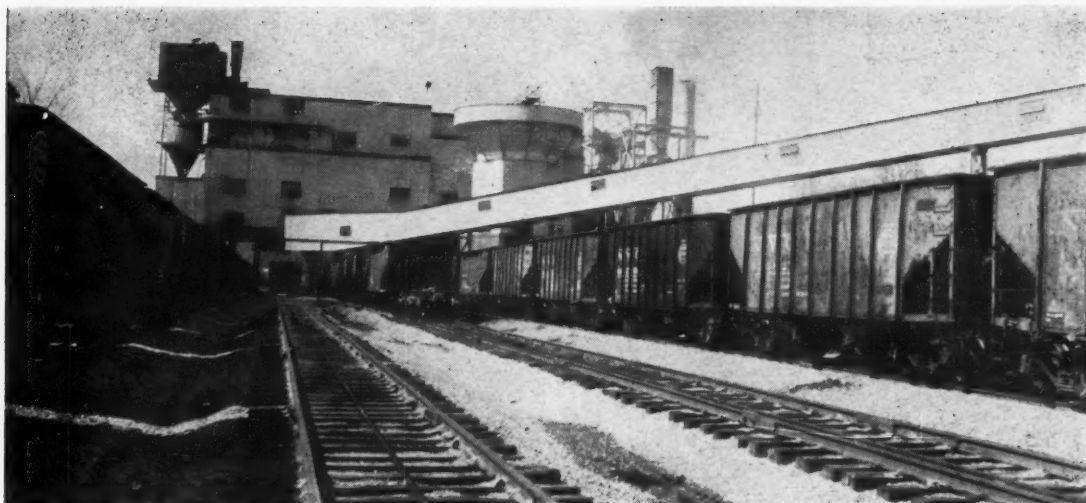
Stripping with 65-yd shovel yields 2,000,000 tons per year. Preparation features two-stage washing, drying.



THREE-LEVEL DRILLING is practiced to provide sufficient pit width for the 65-yd electric stripping shovel.



RIPPER makes two passes in breaking up the 42-in seam. In 2 hr it breaks enough coal for a full shift of loading.



PREPARATION PLANT features two-stage washing, centrifugal and thermal drying, one-man control of cars.

NEWEST BIG PRODUCER in the continuing Peabody Coal Co. program of expansion and modernization, Sunnyhill No. 9 adds 2,000,000 tons per year to company capacity. Located in the Moxahala valley near New Lexington, Ohio, Sunnyhill No. 9 taps a 20-yr reserve of Ohio No. 6 coal. To recover coal at the rate of 2,000,000 tons per year requires round-the-clock stripping with a Bucyrus-Erie 65-yd shovel and two-shift loading with a 10-yd shovel.

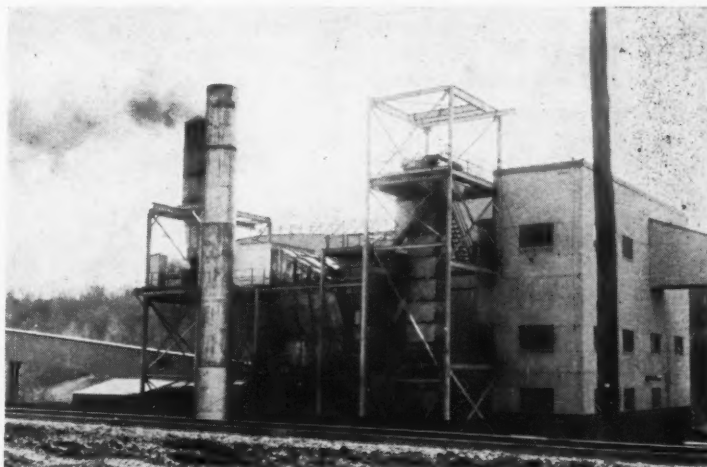
Coal travels to the McNally Pittsburgh preparation plant in 70- and 50-ton Dart trucks where it mixes with coal from Sunnyhill No. 8 before feeding to a rotary breaker making a 6x0 product. Clean coal, recovered in two-stage jig washing, leaves the plant at the rate of 1,000 tph and travels either to four 1,500-ton stockpiles or to railroad cars.

Among the features of the preparation plant are a 480-tph Heyl & Patterson fluid-bed dryer which evaporates 19½ tph of water, one-man control of car loading and vinyl-coated steel sheathing in Peabody colors.

Since 1954 Peabody has invested \$124,000,000 for new properties, modernization of existing ones and acquisition of reserves. During the same period associated companies invested an additional \$18,000,000 for water transportation equipment. In 1960 the company's capital expenditures added up to \$17,400,000, part of which includes development of Sunnyhill No. 9.



OUTDOOR rotary breaker, receiving raw coal from 3,000-ton bin, scalps off large rock and feeds a 6x0 product to a belt conveyor leading to the main plant.



FLUID-BED DRYER outside of main plant handles 480 tph of 1½x28M coal and evaporates 19½ tph of water. Bucket elevator delivers feed to unit.



FORK-LIFT TRUCK moves palletized ammonium nitrate in company mixing plant. Two men handle mixing.



PROPER MIXTURE of nitrate and oil is achieved with aid of metering pump. Resealed bags stand for 12 hr.



SUPPLY of nitrate-oil mixture is packed in polyethylene-lined bags and kept on hand in mixing plant for use in damp holes.



PRIMER with hole in center is lowered into hole with detonating fuse. Units are spaced throughout the charge. Damp holes are charged with AN-oil in lined bags.



The principal property improvements in 1960, in addition to Sunnyhill No. 9, were:

1. Installation of a wheel excavator at River King mine to boost stripping capacity to 2,800,000 tons per year, at the same time improving operating efficiency and increasing recoverable strip reserves.

2. Addition of a new 65-yd stripping shovel at Bevier mine to increase capacity and recoverable reserves.

3. Erection and testing of the electronic push-button miner at Simco-Peabody mine. Use of this type of machine will enable the company, at existing strip mines, to recover economically, millions of tons of deep coal which could be

produced only by more costly underground mining methods.

4. Acquisition of substantial reserves throughout the company's operating area, bringing total reserves to nearly 2.5 billion tons.

In the next 3 yr Peabody plans to spend a minimum of \$50,000,000 on new projects. Included in the program are:

1. Construction of the new Paradise mine, which will employ a giant 115-yd stripping shovel and produce 4,000,000 tons per year.

2. Purchase of a second 115-yd stripping shovel.

3. Purchase of an 85-yd dragline, which will be the largest dragline ever built. (*Coal Age*, April, 1961, p 26).

Overburden Preparation

Overburden thickness in first-cut stripping averages 39 ft, but some banks range up to 120 ft on the outside curves of hills. Except for a 2-ft layer of blue shale immediately above the coal, the overburden is abrasive sandstone.

To keep bank preparation in step with stripping capacity, a Bucyrus-Erie 40-R rotary dry-type vertical drill works around the clock. Operated by two men, the drill works in the center of 18-ft-wide roadways cut into the hillside on 27-ft centers by a Caterpillar D8 bulldozer. Fitted with 9-in Hughes OSCJ and OSVJ bits, the unit spaces holes 36-ft apart on each level to provide a diamond pattern.



OVERHEAD BELT feeds coal to stockpiles through four dropouts, including three telescopic chutes, and spiral.



FRONT-END LOADER with 8-yd bucket fills customers' trucks fast. Unit can load 300 tph from stockpiles.

Because of the abrasive action of the sandstone, bits are worn out after 7,000 to 9,000 ft of drilling. In an average shift a crew sinks 535 ft of blasthole.

Peabody has its own mixing plant where two men work full time on the day shift mixing and packaging ammonium nitrate-oil mixture for both Sunnyhill mines. To simplify handling of 50-lb bags of Lion ammonium nitrate prills in the plant, the men use a Clark fork lift truck to transport pallets of prills.

The men move a pallet of untreated prills to a central location near a fuel oil hose and then place the bags in an upright position. One man lops off one corner of each bag with a pair of hedge shears and the other man follows, metering oil into the opened bags. As soon as a pallet of prills is treated, the bags are resealed with a stapler and stacked in the horizontal position. Treated bags of nitrate remain in the plant at least 12 hr and then are loaded onto a flat-bed truck for delivery to the pit. The men also package some of the treated nitrate in Bemis polyethylene-lined burlap bags for use in damp holes.

If blastholes are dry the nitrate-oil mixture is poured into them. Reinforced Primacord extends the full length of each hole and threads through 1-lb units of Olin Super Prime No. 1, which are spaced through the charge. In dry holes, 1 lb of primer is used per 150 lb of nitrate-oil mix. If holes are wet, the percentage of primer is increased to

1 lb for each 50 lb of nitrate-oil mixture. When water fills the lower portion of a hole the company uses dense Olin water-resistant packaged nitrate-oil-type blasting agent.

To minimize concussion and noise, the blasting crew seldom sets off more than nine holes per shot. And because of the difference in elevation of the drill roads, holes are detonated by rows beginning with the outer or lower row. To get the desired rock fragmentation for efficient stripping, the company uses 1 lb of blasting agent to reach $3\frac{1}{2}$ cu yd of overburden broken. Delay caps, 0 to 200 MS, are used to get maximum useful work from the AN-oil mixture.

Uncovering the Coal

The 65-yd shovel can stack spoil 103 ft high and its dumping reach from the outside of the crawlers is 120 ft 9 in. Its boom is 135 ft long and the effective length of its handle is 91 ft. To keep dust out of the 6,900-V electrical machinery, all cooling air passes through filters before entering the housing.

Pit width ranges from 65 to 120 ft, depending on the topography and shape of the pit. A Caterpillar D7 bulldozer teams with the stripping unit to remove loose material on top of the coal and thus frees the shovel for the major spoil handling job.

Loading and Hauling

To break up coal for easy loading

by the 10-yd shovel, a Caterpillar D9 bulldozer with a hydraulic ripper moves back and forth on 4-ft centers, making two passes over the coal. On the first pass the ripper tooth penetrates half way into the 42-in seam and on the second pass it loosens the lower portion. It takes about 2 hr for the ripper unit to break up enough coal for a full loading shift. The bulldozer helps build roads, cut ditches and performs other miscellaneous jobs.

Sunnyhill No. 9 relies on a fleet of Dart dropbottom trucks to haul coal 1 mi to a 3,000-ton surge bin at the preparation plant. This fleet includes a 70-ton unit powered by a Cummins V12 diesel engine and three 50-ton units powered by Cummins NHRBS engines.

Preparing the Coal

To provide a centrally located modern preparation plant that would serve the untapped reserves of No. 6 coal, Peabody management selected a new plant site near Moxahala. The existing facilities at No. 8 mine had served the company for 13 yr and no longer were centrally located. Furthermore, the No. 8 plant required a large crew.

In June, 1960, ground was broken for the new plant and work began on a 5-mi extension of the N. Y. C. R. R. By the last week of November the mine was ready to produce.

Aside from complete washing and drying facilities, the plant features



SUNNYHILL STAFF includes L. E. Dickerson (left), pit foreman; Oscar Baize, shooting foreman; Gene Pearson, superintendent; F. P. Whittaker, pit foreman; David Nash, warehouse; A. G. Blanc, chief clerk; J. H. Schmidt, preparation plant foreman; and C. H. Glover, chief engineer.

one-man control of loading on four tracks. From his operating station above the tracks he controls the movement of cars, 46 in a string, on each track. Two special McNally-Pittsburg car hauls enable him to handle this job by pushbutton. The loading tracks are level and all car movement is thus controlled by the hoists. Each car haul consists of two coupler cars which are connected by a Leschen 1½-in wire rope put in motion by the tandem-drum hoist.

As one string of 46 cars moves under the loading chute on No. 1 track, another string of empty cars moves up the No. 2 track to be in position for loading when the first group is filled. The operator controls loading on Tracks 3 and 4 similarly. Thus one man loads a total of 184 cars by pushbutton and without the aid of car droppers or a shifter.

The Sunnyhill No. 9 plant also processes coal from Sunnyhill No. 8 which travels 4 mi by rail to the 3,000-ton hopper. A company-owned 50-ton Plymouth diesel engine moves the cars across the hopper and a Hewitt-Robins car shaker speeds coal unloading. About 45 cars per day are hauled from No. 8 to No. 9. The drop bottom coal haulers also deliver No. 9 coal to the 3,000-ton bin.

Coal funnels from the bottom of the hopper into a concrete recovery tunnel where two McNally-Pittsburg 60-in adjustable reciprocating feeders transfer it to a 60-in belt. Traveling at 450 fpm, this conveyor de-

livers the raw product to an outdoor McNally rotary breaker that scalps off large refuse and reduces the remainder of the feed to 6x0. Breaker refuse discharges onto a 24-in scraper conveyor which carries it to a 15-ton steel bin for removal to a disposal area by three 15-ton Dart end-dump trucks.

The 6x0 breaker product discharges onto a 48-in belt traveling 650 fpm and is carried to the top of the plant. There it drops onto a scraper distributing conveyor which splits it into equal feeds for two McNally Pittsburg 5-cell wash boxes. These units make a separation into clean coal, middlings and refuse. Middlings flow to an American ring crusher, are broken to 2x0 and recirculated to a McNally 3-cell secondary washer.

Clean coal from both washing circuits travels to a pair of clean-coal shaker screens for separation into 6x2, 2x1½, 1½x28M and 28Mx0. The 1½x28M flows to three Allis-Chalmers Low-Head vibrators which make a further separation into 1½x¼ and ¼x28M. The smaller product feeds to three Reineveld centrifugal dryers and then recombines with the 1½x¼ before dropping onto a 48-in scraper conveyor. This unit feeds a bucket elevator that discharges into a Heyl & Patterson fluid-bed thermal dryer, which has a rated capacity of 480 tph of wet feed and is designed to evaporate 19½ tph of water.

Dried coal drops onto a 48-in

scraper conveyor that feeds three Allis-Chalmers Ripl-Flo vibrators making a separation into 1½x¼ stoker and ¼x28M. These two products can be delivered either to railroad cars or to stockpiles. A Pangborn dust-collector system with intakes over the clean-coal screens removes fine dust from the sizing area.

Clean 6x2 flows either to a stock pile, to railroad cars or to a Gundlach two-stage crusher for reduction to 2x0. The crusher product and the 2x1½ from the clean-coal screens may be stockpiled or loaded into railroad cars.

Washer refuse passes by chute to a 30-ton bin and is hauled away to a disposal area by the Dart dump trucks. The 28Mx0 flows to a settling tank where solids are concentrated and then pumped 1,500 ft to a settling pond.

Stockpiling

Sunnyhill No. 9 sells more than 300,000 tons a year to truck customers. A 550-ft belt conveyor in an enclosed gallery carries coal overhead from the plant to four dropout openings to the stockpiles. Three of the openings have telescopic chutes and the fourth has a lowering spiral to minimize breakage of egg coal. To load customers' trucks rapidly the company relies on a Hough Payloader with an 8-yd bucket. This unit can load 300 tph from the stockpiles.

Fire-Resistant Fluids . . .

What 100% Users Have Found

Equal or better production, no pump problems, lower consumption of hydraulic fluid and lower cost of fluid per ton cited as major benefits from emulsion-type fire-resistant fluids.

HOW DOES emulsion-type fire-resistant hydraulic fluid stack up in underground service? How does equipment perform? What about fluid consumption, handling procedures, storage and cost per ton? To get the answers to these and other questions frequently asked about fire-resistant fluids, *Coal Age* first checked with the manufacturers of approved fluids to arrive at the number of operations using such fluids 100%. This and other checking turned up 13 mines 100% on fire-resistant emulsions as of July 1. All 13 were approached by *Coal Age*. Nine provided data.

The nine mines which supplied data on their experience to date operate in Kentucky, Pennsylvania and West Virginia. Capacities, derived from data in *Keystone Coal Buyers Manual*, a *Coal Age* affiliate, are as follows:

Mine	Capacity, Tons per Day
1	4,500
2	1,000
3	1,200
4	2,250
5	2,250
6	4,300
7	1,300
8	1,000
9	1,500

It should be noted that eight of the nine mines use one brand of premixed emulsion. Therefore, the great majority of the data to follow pertain to this one fluid.

Most of the mines were visited by a member of the *Coal Age* staff; others supplied detailed answers to

a series of questions designed to bring out experience and results.

The term "100%" is subject to some exceptions. One mine at the time of the survey was keeping one section on conventional fluid until the supply on hand was used up, at which time it planned to go completely emulsion.

Some of the mines have been 100% users of fire-resistant fluid for more than 8 mo, others have used it for 5 to 6 mo and a few have had several months experience. Although some companies report that they want more time to evaluate the fluid and accumulate data, none has been disappointed and all have expressed satisfaction and noted benefits. Here is what they say in reply to survey questions.

What equipment uses the fire-resistant fluid?

Operators report that they use the fluid in all conventional equipment. One company plans to use the emulsion experimentally in a belt drive.

How do machines operate with the fire-resistant fluid?

Companies note that they are getting as much or more coal with equipment filled with the emulsion as when using petroleum oil. Some operators report that the machines are more responsive than with petroleum oil, others say there is no noticeable difference in performance. Only one mentions that certain units on occasion, and for some unknown

reason, do not operate normally. An added benefit cited by one company is lower operating temperature for equipment as well as excellent performance and response.

What about pump life?

No pump problems resulting from use of the emulsion type fluid have been reported during the period in which the fluid has been used. Several companies say that, although no pump troubles have been noted, they have not had the fire-resistant fluid in service long enough to reach a conclusion.

The majority, however, believe they have had enough experience and therefore have formed opinions. One company, for example, has been using the emulsion-type fluid for 6 mo and reports that no pumps failed. Another notes that pump troubles have been non-existent in the 3 mo that the emulsion type fluid has been used. It adds that some pump trouble could normally be expected in this period.

Pump and motor life are better than with premium-quality petroleum oil, reports another operator. The company has not had the failures sometimes experienced with conventional fluid.

After conventional fluid was replaced with the emulsion-type fluid, a very significant reduction of 75% in fluid loss through a leaking pump was noted at another company.

How does fluid consumption compare?

All companies using the emulsion cite a definite decrease in consumption of hydraulic fluid. A number of operators say that consumption has been cut about 3 to 1. In three instances operators put the reduction in consumption specifically at 50, 45 and 50%, respectively.

How does the cost per ton compare?

In general, the cost of fluid per ton has decreased. One company is charging the expense of replacing conventional fluid in all units to the cost of coal. For this reason, the initial installation increased the cost per ton. But once this initial expenditure is written off, the day-to-day cost per ton will be less than with conventional oil. Although its cost per ton has decreased, another company makes the statement advisedly because of the shorter period the emulsion has been in use.

How is the fluid bought?

All mines but one buy the emulsion pre-mixed. One company purchases the pre-mixed product in bulk and the others prefer to have it delivered in 55-gal drums. Concentrate is purchased by one company for one of its two 100% operations and pre-mixed for the other. Mixing the concentrate with water has not been inconvenient under the company's conditions and with the available facilities.

How often is water added?

Mines find that it is necessary to add little or no water to the systems. For example, several companies operating single shift have not found it necessary. In some few instances it has been necessary to add water when the company operates three shifts. But it is a minor problem.

Several companies take periodic samples of the fluid from the machines and test it in the laboratory for the proper water content. One of these companies adds water an average of twice per month and the other reports that water consumption is very low.

How is the fluid handled?

Most mines handle the fluid the same as normal petroleum oil but a few take extra precautions, such as directing heat onto barrels stored in a metal building, or taking the fluid into the mine as soon as it is received.

Several companies stored the emulsion outside during the past winter in temperatures that plunged to as low as -15 F and no difficulty

was experienced. One company, for instance, stored 55-gal drums outside for a month. Another company receives its supply by tank truck in bulk and stores it outside in a 3,000-gal tank. Temperatures in the past winter dropped to -15 F at this mine with no apparent affect on the emulsion. One company notes, however, that the emulsion runs slower in cold weather.

Are users satisfied?

No users expressed dissatisfaction with the emulsion. Comments range from "very satisfied" and "increased efficiency" to a statement that no loss in efficiency in mining has been experienced, and that cost appears to have been lowered though the period of use has been too short to make a definite statement.

One company says that the equipment operates more efficiently because the emulsion, when heated, does not lose its viscosity and there-

fore equipment response is not slowed down. A further benefit cited by another producer is that output has increased because no time is lost adding fluid.

All the mines say they will continue to use it.

Emulsion pointers

In addition to the answers to the specific questions the *Coal Age* survey brought out a number of additional points in connection with the use of emulsion-type fluids. Among them were the following:

Operating temperature of the emulsion is lower than regular petroleum oil.

Emulsion can be stored underground without being in violation of the mine law. Thus it is possible to have a storage area in each section. Barrels are placed on their sides in a rack and the emulsion withdrawn through "molasses gate" valves and delivered to the face in

Approved Fluids

Following is a list of fire-resistant hydraulic fluids approved by the Bureau of Mines to date under Schedule 30. All except Celanese and Monsanto are emulsions.

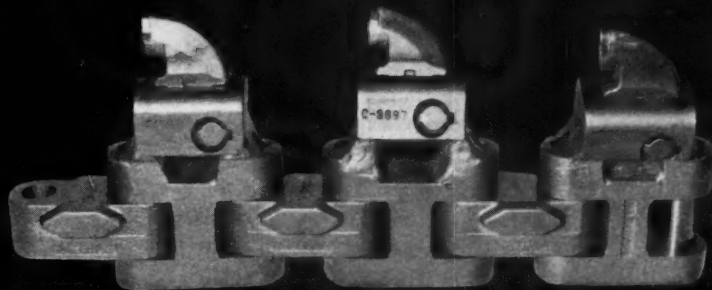
Approval No.	Company	Product	Date Approved
30-1	Shell Oil Co.	Shell SL-7361 FRM Fluid	2/18/60
		*Shell 3XF Mine Fluid	2/18/60
30-2	Celanese Chemical Co.	Cellulube 220	4/18/60
		Cellulube 300	4/18/60
		Cellulube 90	5/3/60
		Cellulube 550	5/3/60
		Cellulube 1000	5/3/60
		Cellulube 150	7/11/60
30-3	Socony Mobil Oil Co., Inc.	TL 10	7/6/60
		*TL 9	9/7/60
30-4	Hulburt Oil & Grease Co.	Hul-E-Mul, formerly	
		Hulburt FRF-32	7/13/60
30-5	The Atlantic Refining Co.	*HYDRAULIC-FRC	7/19/60
30-6	Monsanto Chemical Co.	Pydraul F-9	9/8/60
30-7	Gulf Oil Corp.	Gulf FR Fluid	9/7/60
		*Gulf FR Concentrate	9/7/60
30-8	Sun Oil Co.	Sun Minesafe Fluid	10/11/60
		*Sun Minesafe Concentrate	12/13/60
30-9	Texaco, Inc.	Texaco TL-4625	12/28/60
30-10	Humble Oil & Refining Co.	WS-4292 Hydraulic Fluid	1/5/61
		*WS-4254 Hydraulic Fluid	
		Concentrate	1/5/61
30-11	Sinclair Refining Co.	Duro F-R 60	3/8/61
		*Duro F-R Concentrate	3/8/61
30-12	American Oil Co.	AMOLIND Hydraulic Fluid FR	3/17/61

*Concentrate—water to be added by the user in accordance with instructions from supplier.

Setting New Production Records with

CINCINNATI RAP-LOK EQUIPMENT

ON BORING TYPE MINERS

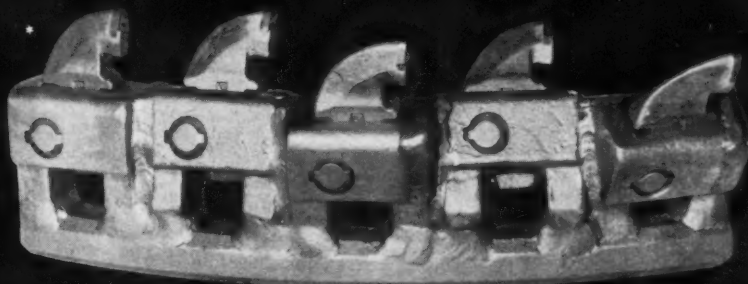


RAP-LOK TRIMMER CHAIN FOR BORING MACHINES

Designed to utilize the full potential of your high productive mining machines. The RAP-LOK feature producing the faster and more effective setting of bits combined with the time-tested CINCINNATI CHAIN utilizes the full potential of your machine.

RAP-LOK BITS AND BIT HOLDERS FOR BORING ARMS

This combination is made to fit all types of Boring Machines and designed to meet specific mining conditions encountered in your mines.



* Patented.

The use of the CINCINNATI TRIMMER CHAIN in combination with the CINCINNATI ARMS as described above provides the highest degree of efficiency in CONTINUOUS BORING OPERATIONS. While the Trimmer Chains and Arms can be used independently, the maximum in efficiency is realized through this NEW advanced combination. CINCINNATI RAP-LOK EQUIPMENT is fast acquiring the fine reputation of all CINCINNATI products.



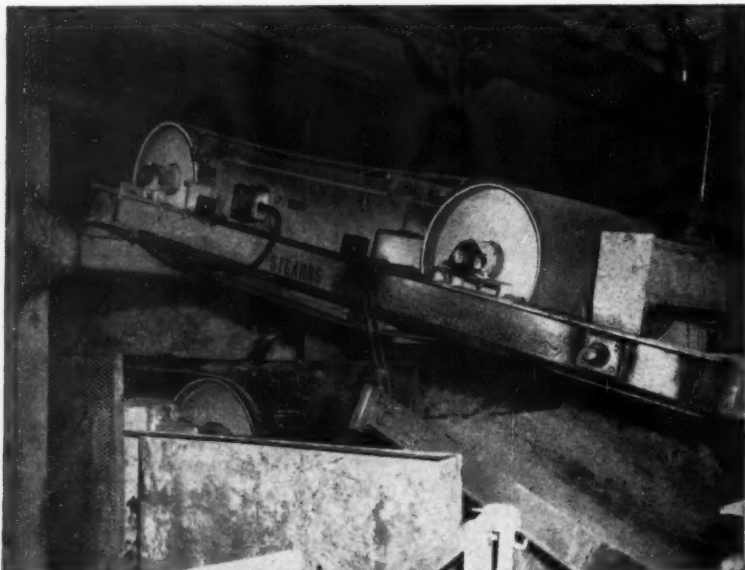
Patent Pending

Bits are set and removed more rapidly with the RAP-LOK bit setting tool.

THE CINCINNATI MINE MACHINERY CO. Cincinnati 25, Ohio

Stearns offers you the STRONGEST, MOST RELIABLE oil-filled suspended magnet*

Stearns In-Line automatic self-cleaning suspended tramp iron separator angled over the head pulley of a fast moving coal conveyor.



In-Line and Cross-Belt Self-Cleaning Styles or Rectangular Unit Only Available in a Wide Variety of Field Strengths for Belt Widths to 60 inches.

Stearns oil-filled suspended magnets have been *job-proved* in scores of tramp iron separation applications in foundries and for crusher and pulverizer protection in power installations, coal, metallic, non-metallic and slag processing plants throughout the world.

Now Stearns has extended the benefits of these powerful tramp iron separators to meet the requirements of practically any application.

Stearns' broad application-engineering experience, coupled with the latest in separator design features, can provide the protection you need at real value prices.

CHECK THESE STEARNS VALUE-FEATURES BEFORE BUYING

1. Space-wound construction provides maximum oil flow for coolest operation, highest efficiency.
2. Oversized coil core cross section for most efficient use of ampere-turns means greater

strength, lower power consumption, smaller over-all size.

3. Top-grade transformer oil with oxidation inhibitor.
4. Pressure-sealed, high-voltage-range terminals and oil-tight, completely enclosed junction box provide maximum lead protection.
5. Machine-welded outer case and expansion tank protected by relief valve.
6. All units subjected to full-power, 24-hour factory test.

In addition, In-Line and Cross-Belt Self-Cleaning Units also feature:

1. Extra non-magnetic bottom wear plate to protect coil enclosure
2. Lifetime-lubricated pulley bearings
3. Motor-gear reducer chain drive
4. Heavy-duty belt styles to match the job

* Let us prove it . . . call in one of our engineers today for a job-studied recommendation and price quotation. Ask for new Bulletin 1032U



STEARNS MAGNETIC PRODUCTS

635 South 28th Street
Phone EVergreen 3-4800

Milwaukee 46, Wisconsin
Direct Distance Dialing Code 414

Profit with Stearns — First with Ceramic Magnet Separators for Industry

5-gal cans, which are easily handled.

Openings in filters must be enlarged because of the different characteristics of the fluid.

The color of the fluid makes it very easy to detect the source of leakage. Hence losses can be kept to a minimum.

One company reports using the emulsion experimentally in an AC 5 high lift unit which is used to load coal from a stockpile. Machine response has been normal and no problems have been encountered.

The emulsion tends to seal leaks. For example, one company learned that the packing in the boom jacks of a 10-RU cutter had to be loosened after filling the system with emulsion.

One company added the emulsion directly to the regular petroleum oil as fluid was needed. No harmful effects were noted.

Mechanics like the fluid because it is cleaner to work around.

Success Secrets

Some of the secrets contributing to success at these properties are as follows:

Keep the hydraulic system free of suction-line leaks. A tight system minimizes foaming which is undesirable with any fluid. Furthermore, suction-line leaks result in loss of pump efficiency, shorter pump life and accompanying loss of production.

Make sure that the entire hydraulic system is clean and then keep dirt from entering it. An emulsion in combination with return-line micron filtration is said to make it possible for a hydraulic system to be cleaner than ever before.

No hydraulic system should operate at a temperature as high as 200 F. Use of an emulsion forces a company to correct this defect. One large pump manufacturer recommends 130 F as the upper temperature limit for efficient pump operation with normal petroleum oil. Field experience indicates that this is difficult although not impossible of attainment.

Consider buying pre-mixed fluid. Some of the advantages cited are: no mixing equipment is needed; no labor required; manufacturers have better mixing facilities which yield a better product; and the supplier guarantees his mixture.

TIMBERED AREA COLLAPSED... BUT YIELDABLE ARCHES HELD

Here's a dramatic example of Yieldable Arches doing their job. Men were re-timbering the roof in the foreground when a large fall occurred. The tunnel was destroyed in the timbered area, right up to the edge of the Yieldable Arch installation. The Arches yielded, and sagged a bit . . . but they held!

One look at the picture, and you can't help wondering how such relatively slim members could support the crushing weight. The answer is: it's not the *strength* of the Yieldable Arch that does the trick, it's the *give*. By yielding a little at a time, the Yieldable Arch gives the overburden a chance to arch over and establish equilibrium, thus in large measure sustaining itself.

A Yieldable Arch set is built up of three or more U-shaped rolled-steel segments which nest together at the ends to form a friction joint. Stout U-bolt clamps secure this joint and hold it fast under normal loads. Excessive pressures will overcome the friction in the joint, however, permitting the Arch to give gradually. Horizontal struts act as spacers and provide lateral rigidity to the structure.

Most mines have found that Yieldable Arches pay for themselves in their first year of service. They can be installed by your own men, and have high salvageability. Let one of our engineers discuss them in detail with you.

Just get in touch with our nearest office.



for Strength
... Economy
... Versatility

BETHLEHEM STEEL COMPANY, Bethlehem, Pa.
Export Sales: Bethlehem Steel Export Corporation

BETHLEHEM STEEL





TRANSPORTING COAL from mine to preparation plant requires 1,394 ft of belt conveyor. Initial storage bin (right) has a capacity of 60 tons. Concrete-slab silo (left) provides an additional 600-ton storage area.

Elkay Preparation-Plant Highlights . . .

Simplicity in Design . . . Control for Quality

UPDATING PREPARATION FACILITIES to meet the challenge of changing market conditions and carefully worked out inspection and quality-control programs strengthen Elkay Mining Co.'s future. Simplifying design, utilizing a minimum

of equipment and, in some instances, making good use of existing equipment characterizes preparation facilities at the Elkay operation, Earling, W. Va. The practical combinations of new and old units achieve and exceed quality standards with

a minimum work force, consisting of four and five men on the day and evening shift, respectively.

Located in the heart of the bituminous coal region of West Virginia, Elkay mines the 42-in Cedar Grove seam and markets its product under the tradename "Elkay." The entire production of the company's 3A mine is marketed by the Logan-Kanawha Coal Co., Inc., with general offices in Cincinnati, Ohio, and district offices in Norfolk, Va., Chicago, Detroit and Huntington, W. Va.

The 3A mine was opened in 1957, several years after one of the other seams on the property had been ex-



MODERN MINING METHODS coupled with conventional equipment such as cutting machines, loaders, shuttle cars and rail-haulage units are employed to produce coal at the Elkay 3A mine.



SIMPLICITY OF DESIGN, utilizing a minimum of equipment, enables Elkay Mining Co. to produce a quality product at minimum preparation cost.

hausted. The existing preparation-plant structure formed the basis for the present modern facility. This permitted the company to minimize capital investment and at the same time construct a preparation plant capable of producing a premium-quality product.

Modern mining methods coupled with conventional mining units, such as, universal cutting machines, loaders, shuttle cars and a rail-haulage system are the keys to economical production at 3A.

The Cedar Grove seam lies approximately 400 ft above drainage. Transporting coal from the mine to

the preparation plant requires 1,394 ft of belt conveyor.

Raw-Coal Handling

Coal is dumped into a 60-ton storage bin at seam level from 2½-ton (clean-coal weight) drop-bottom mine cars and then fed onto a 30-in Hewitt-Robins belt conveyor. Coal is automatically weighed on an ABC belt scale and conveyed 234 ft to a 600-ton concrete-slab silo. From there the coal is fed onto another 30-in belt which takes it 902 ft to another belt conveyor 258 ft long.

Coal is fed onto a Kanawha 5-in-

step-screen shaker. This section of the plant is some 300 ft from the main plant. Oversized material is crushed to 6 in. This, plus the through product, is united on a 36-in belt conveyor. Half of the 6x0 product goes to a 6x12-ft Allis-Chalmers vibrator and the other half to a 6x16 Hewitt-Robins vibrator.

Minus ¼-in product is removed and chuted to a 30-in belt conveyor which takes it to the top section of a mixing conveyor for loading into railroad cars.

Coarse-Coal Washing

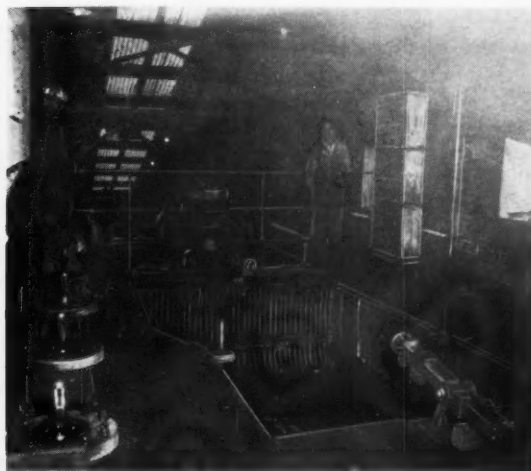
The 6x¼ through product from the vibrators is discharged into a two-compartment McNally Norton washer. Primary separation at the feed end of the washer removes the heavier refuse material, which is elevated and discharged onto a Long-Airdox chain conveyor. This primary reject then goes to a 40-ton refuse bin for disposal by truck.

The secondary compartment divides the coal into a bottom layer of middlings (near gravity material) and a second layer of high-quality coal.

Clean-Coal Classifying

Clean coal (6x¼) discharges into a 6x14 Hewitt-Robins dewatering vibrator and then onto a Fairmont classifying shaker. The vibrator is equipped with clean-water sprays.

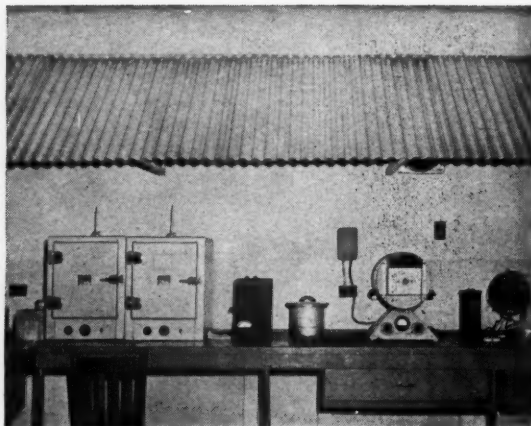
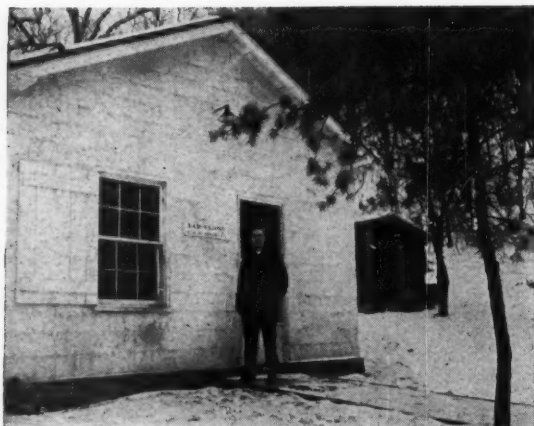
Underflow from the dewatering



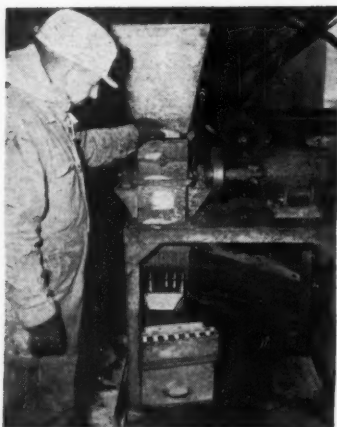
JIG WASHER processes approximately 2,000 tpd of raw coal. Design features provide for additional capacity.



CLEAN COAL from washer is dewatered on a 6x14 vibrator before discharging onto a classifying screen.



QUALITY IS SAFEGUARDED by well-equipped laboratory. Analyses include the proximate tests as well as F.S.I.



SAMPLES ARE CRUSHED and screened at the preparation plant. A minimum of 60 lb of coal is taken from each railroad car to prepare samples.

screen goes to a drag tank to remove all minus $\frac{1}{4}$ -in material. It is conveyed by a 16-in screw conveyor to a CMI dryer and combined with the $\frac{1}{4} \times 0$ product on the top mixing conveyor for loading into railroad cars.

Effluent goes to an effluent sump and then is pumped to a sludge pond by a 4x3 Allis-Chalmers pump.

The $1\frac{1}{4} \times \frac{1}{4}$ product made on the classifying screen discharges onto a 24-in belt conveyor and is delivered to a 6x14-ft Allis-Chalmers vibrator to remove minus $\frac{1}{4}$ -in material, which is combined with the $\frac{1}{4} \times 0$ on the top mixing conveyor. The $1\frac{1}{4} \times \frac{1}{4}$ also goes to a separate compartment in the top mixing conveyor and then to the bottom mixing conveyor for loading into railroad cars.

The second product from the classifying shaker ($2 \times 1\frac{1}{4}$) goes to an apron conveyor. It can be loaded

into railroad cars or bypassed to a crusher and reduced to $1\frac{1}{4}$ in.

The remaining 6×2 -in size is classified into two products, 3×2 and 6×3 . The 3×2 can go to the mixing conveyor or an apron conveyor for direct loading. If it goes to the mixing conveyor it is crushed to a top size of $1\frac{1}{4}$ in in a Dunlap crusher. The crushed product then passes over a 4x8 Link-Belt vibrator to remove undersize ($\frac{1}{4} \times 0$) coal before being loaded into railroad cars. The 6×3 -in product from the classifying screen is loaded separately.

Standard sizes produced at the plant include 6×3 , 6×2 , 3×2 , $2 \times 1\frac{1}{4}$, $2 \times \frac{1}{4}$, modified $1\frac{1}{4} \times \frac{1}{4}$, $1\frac{1}{4} \times \frac{1}{4}$ and $\frac{1}{4} \times 0$. Minus 2-in sizes can be oil treated.

Fresh water is pumped from the nearby Guyandotte River by a 3×2 Allis-Chalmers pump using a 4-in pipe line. Water is stored in a 50,-

000-gal tank above the preparation plant.

Four men are required to operate the entire plant, including an operator, slate pusher, trimmer and car dropper. One extra man is used on the evening shift to haul refuse. Two mechanics are employed on the third shift to perform routine and preventive-maintenance work.

Quality Control

Carefully worked out inspection and quality-control programs are in effect at the Elkay, No. 3A plant. The programs include visual and mechanical inspections as well as control of the washer and evaluation of the quality of coal produced and loaded into railroad cars.

The company has a modern laboratory on the property near the plant, and laboratory-type crushing, screening and sizing facilities within the plant for quality control. The lab is under the direction of Carl Mounts. Coal is continually sampled from the mines and preparation plant. General practice is to sample cars of 2-in coal and under regularly. Other tests, such as, screen tests and pre-sampling of plus 2-in are made continuously. A minimum of 60 lb of coal is taken from each car for sampling purposes.

Reports containing complete analyses of all cars sampled are sent to the sales department, and are furnished to customers upon request. Analyses include moisture, ash, Btu, sulfur, volatile, fixed carbon and F.S.I., when necessary. Special tests are made at customers' request.



16,000 ft. of neoprene-covered belting hauls jagged slate and coal to rail points at 250-300 ft./min. Installed in September '58, belt is specially designed for underground service.

LIGHTWEIGHT CONVEYOR BELT THRIVES ON HEAVY-DUTY SERVICE!

Still "like new"—despite nearly three years of brutal underground service! That's the latest report from Royalty Smokeless Coal Co.'s Medo No. 2 Mine, Cliff-top, W. Va., following a recent inspection of the belt shown above. And here's the reason: covers of tough, resilient *neoprene* synthetic rubber, coupled with a unique, lightweight, all-synthetic carcass.

Neoprene's reputation for prolonging belt life is based on its resistance to conditions that pound the life out of ordinary belting. Flexible and fire-resistant, neoprene also defies abrasion and impact, protects belt carcass from oil and grease, moisture and mildew. And

its high coefficient of friction minimizes spillage, slippage and "run out" at loading points—delivers maximum loads over the head pulley.

Next time *you* order belting, make sure it has a cover of rugged, longer lasting Du Pont neoprene. No other material has been so thoroughly proven in severe mining service above ground and below... as cable jacketing, conveyor belting and hose. For more examples to show how neoprene-covered belts are serving industry, write: E. I. du Pont de Nemours & Co. (Inc.), Elastomer Chemicals Department CA-8, Wilmington 98, Delaware.

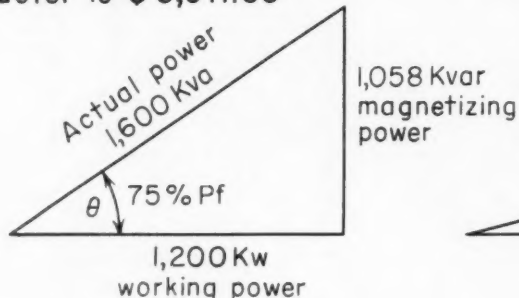


NEOPRENE
SYNTHETIC RUBBER

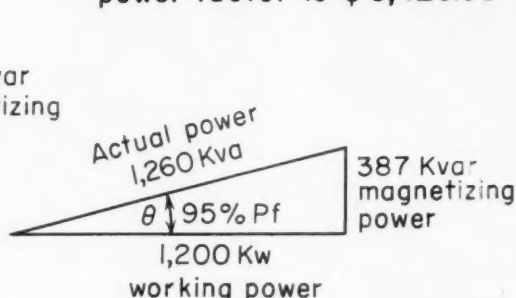
Better Things for Better Living . . . through Chemistry

Annual saving in power bill at 95% power-factor, compared with 75% power-factor, is \$5,815.20

Monthly power bill at 75% power factor is \$3,911.55



Monthly power bill at 95% power factor is \$3,426.95



What You Should Know About Power-Factor

A good system power-factor can save your company money by reducing power bills, improving motor performance and taking the system out of the low-power-factor penalty area. Here are some of the things you should know before tackling the job of power-factor correction.

WHY consider power-factor at all? The answer is simple. It is a matter of economics and it is as important as controlling supply cost, maintenance, production downtime and all other cost-reducing measures which are necessary to mine coal at a profit today. The savings that a good system power-factor provides is substantial and warrants close scrutiny by top management. It is not necessary to be an electrical engineer to recognize the values of good power-factor nor indeed necessary to understand it. The economic and operating benefits are:

1. Release of system capacity.

By providing a good power-factor it is possible to reduce the load in an overloaded system and even make available more capacity for adding more load to a system without the added expense of installing larger transformers, conductors and switchgear.

2. Lower power bills. A good power-factor automatically reduces power-system demands and in many cases actually reduces energy charges. It also takes the system out of the low-power-factor penalty area.

3. Better voltage at motor terminals. Better voltage regulation accompanies good power-factor. This

enables motors to perform better, thus reducing motor-repair costs.

What Power Factor Is

AC electric-power system components, such as, motors, generators, transformers, etc., must be magnetized before they can do work. This magnetizing force, known as induction, is an AC characteristic which makes it possible for motors, transformers and the like to operate. Without it there would be no work performed. Loads generated by equipment of this type, and in fact most AC components, are classified as inductive loads. Although essential in an AC system, this inductive loading or magnetizing force induces a voltage in the system in such a direction as to oppose the change causing it. In other words, it produces opposition to the flow of alternating current.

An induction motor, for example, requires a certain number of kilowatts (kw), or work-producing power, to perform efficiently. But it also must be supplied with sufficient magnetizing force, or kilovolt-amperes-reactive (kvar) power, to energize the motor. This latter power does not do any work. However, kw and kvar flow together in

the circuit. The word "reactive" simply reflects the fact that this power is a result of a reaction: i.e., when working power is supplied to an electrical component a reactive power also is impressed upon the component and system.

In effect, there is one type of power (kw) being supplied to the load to do work and another type (kvar) to establish a magnetic field to set up the conditions which make it possible for inductive-type equipment to operate. The latter opposes working power and loads the system with non-producing kvar power.

The amount of kvar and kw power in a system determines the power-factor. The smaller the kvar value with respect to kw, the better the power-factor. An induction motor operating at full load, for example, will have a much better power-factor than a motor operating at half-rated load. Why? The amount of kvar required to magnetize a motor does not change as much as the kw demand when the motor operates at full- and half-rated load.

Previously, it was stated that inductive loads induce a voltage in such a direction as to oppose the change causing it. This indicated that kvar power acts in a different direction than kw, and for all practical purposes it does. The reactive current lags the voltage by 90 deg.

There also is another type of kvar load. This is a capacitive load which is produced by electrostatic energy in a load. This type of load is produced by capacitors, reactors and overexcited synchronous motors.

Most AC mine loads are predominantly inductive, resulting in a lagging power-factor. Capacitors, reactors and synchronous motors produce the opposite, or a leading power-factor. The power factor of a component or distribution system is the cosine of the angle of lag or lead of the current with respect to voltage. This angle is obtained by assuming graphically that the kvar load is flowing at right angle to the actual kw load. If these values of kw and kvar are projected on paper a right triangle is formed from which the cosine angle is found (see illustration).

The most desirable power-factor is 1 or 100%, which is unity power factor. This results when the value of a lagging inductive load is equal in value to a leading capacitive load. By convention, kvar flowing out of a load (leading pf) is negative, and kvar flowing into a load (lagging pf) is positive. Therefore, the amount of capacitive load is subtracted from the inductive load. This reduces the total kvar of a load or system.

For example, if an inductive load was 135 kvar and a capacitive load was 45 kvar the resultant kvar load would be 90. If the 135 kvar inductive load was equalled by a like amount of capacitive load the power-factor would be 1 making the power factor 1 or 100%.

If power-factor is still not quite clear it can be likened to mechanical friction. It may not be entirely electrically correct but it may clear up confusion. Like mechanical friction it is something we cannot avoid. It must be dealt with whether we want it or not. The job is to control it. Friction is a mechanical force which resists the relative motion between two bodies in contact. Power factor, on the other hand, is an electrical force which either affects the flow of working current (inductive or lagging force) or opposes changes in voltage (capacitive or leading force).

Friction can be reduced when desired by correctly designing mechanical parts, properly applying bearings at points of moving contact and by proper lubrication. The power-factor of a load or a complete electrical system can be improved by proper application of induction motors, use of synchronous motors when possible and applying capacitors to overcome the dominating inductive or lagging kvar load. It is that simple.

In actual practice it is difficult to obtain unity power-factor and the benefits of achieving it normally do not warrant the additional cost. However, a good power-factor would be about 0.95 or 95%.

Power-factor is a problem common to AC systems only. DC systems do not contain inductance and capacitance. DC power does not alternate or cycle at 60 cps as does

AC. The only opposition to current flow in DC systems is the resistance of conductors, motors, controls, etc.

An AC power source alternates between positive and negative values at a rate of 60 cps. In an AC induction motor, for example, the field is magnetized and demagnetized every time the current reverses direction. This is what causes most of the kvar load of AC components, including transformers, etc.

The current flow in a DC system is in one direction—does not alternate. When the field of a DC motor is magnetized, it remains magnetized as long as power is applied. It does not magnetize and demagnetize since the current and voltage do not alternate.

Power Rates—Power contracts include rates which are based on classification, diversity factors, load power-factor, demand power-factor, monthly power-factor and cost of producing power. All contracts do not contain power-factor clauses. Whether this clause is included or not, it is to the advantage of the consumer to maintain a good power-factor. The benefits discussed previously will still be realized.

When the power-factor clause is part of the contract, it compensates the power company for the variation in the cost of delivering power. A poor power-factor places a heavier demand on the power company and it charges the consumer for this increased demand. When a consumer has a poor power-factor it is difficult for the power company to provide good voltage regulation.

Investment in system equipment is larger and capital charges and maintenance cost are greater. This is why the power company penalizes consumers for poor power-factor. The consumer should attempt to maintain a good power-factor in his own system for the same reasons.

Most power-factor clauses require the consumer to maintain an 85% power-factor. If this is maintained the consumer is billed for the kwhr of power consumed, depending on the type of power contract. If it is not, the kwhr consumed is multiplied by a factor which is derived from and which varies with the power factor.

BIG APPETITE



...for those tough stripping jobs!

HENDRIX Heavy Duty Mining Buckets

Tough stripping operations are no problem for the Hendrix "MH." Its built-in stamina and ruggedness will consistently withstand the impact and shock of the toughest mining applications . . . assuring peak performance at a lower cost-per-ton.

- LESS DOWN-TIME
- MORE PRODUCTION
- LESS MAINTENANCE
- LOWER COST-PER-TON

3 to 40 Cubic Yards With or Without Perforations

HENDRIX MANUFACTURING CO., INC.

MANSFIELD, LOUISIANA

HIGHER ARCH · WIDER FRONT · TRI-TAPERED BASKET · GREATER STRENGTH

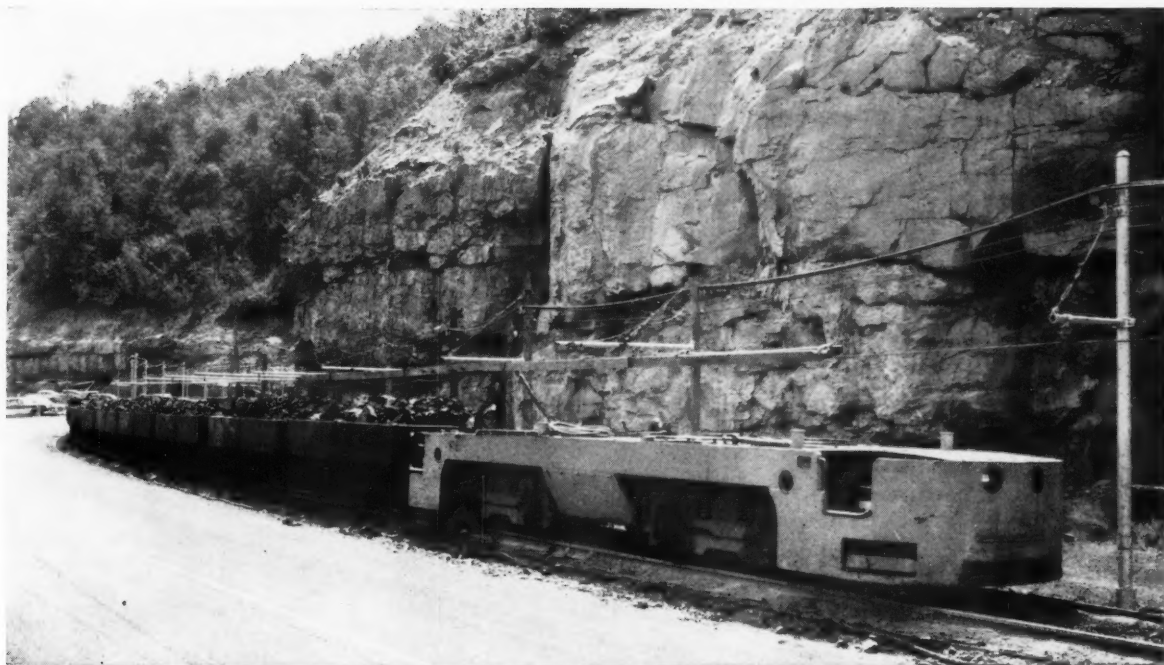
For heavy hauling
you'll do better
with **JEFFREY**
8-wheel Trolley
Locomotives

Big coal loads can be hauled fast with Jeffrey 27, 37 or 50-ton single-unit locomotives.

Operation and maintenance are better, too. The four-wheel, equalized double trucks and the short overhang at the ends give an easy ride at high speed. The eight wheels distribute the locomotive's weight for less concentrated rail loading.

Outstanding operating and safety features include: roller-bearing type journal boxes and motor axle suspensions . . . air and dynamic service brakes . . . automatic couplers with air-operated uncoupling . . . trolley with air-operated retriever . . . separate blower for each motor.

Other features of 8-wheel locomotives and other types for mainline and secondary haulage are described in Catalog 836. For a copy, write to The Jeffrey Manufacturing Company, Columbus 16, Ohio.



If it's conveyed, processed or mined, it's a job for Jeffrey.



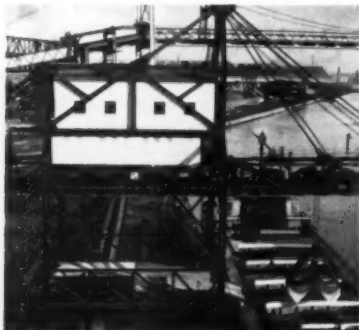
JEFFREY



How Dravo serves the mining industry

MATERIALS HANDLING EQUIPMENT

Traveling unloader removes iron ore at the rate of 1600 tons per hour from Great Lakes ore boats at this dock on Chicago's Calumet river. Check the coupon at right for information on Dravo equipment for the fast handling of ore, coal and a great variety of dry bulk materials.



ORE PROCESSING

Over 45% of sinter capacity added by U.S. steel industry in last 5 years has been furnished by Dravo—including this 2400-ton-per-day plant. Check coupon for information on sintering, briquetting, pelletizing and ore beneficiating facilities at mine or plant site.



SPECIAL CONSTRUCTION

Head frame (left foreground of photo) sits astride 575-ft. concrete-lined ventilating shaft at an eastern coal mine. Construction of shafts, slopes, tunnels, docks and harbors are part of Dravo's half century of experience in special construction for the mining industry. Mail coupon at right for more information.





Dravo furnished ore handling and agglomeration facilities for this midwestern steel producer.

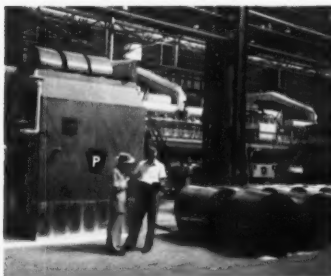
PLANT UTILITIES

When completed, this modern intake and pumping station will handle up to 30 million gallons of water daily. Such Dravo turn-key projects include oxygen, power and boiler plants, compressor stations, special mine, utility and plant facilities. Check coupon for information.



SPACE HEATING

One of 60 Dravo space heaters which supply comfort heating in this large strip mill. Over 20,000 ($\frac{1}{4}$ to 3 million btu) are in use throughout industry for processing, manufacturing, warehousing and other structures. Check and mail coupon for details.



Dravo Corporation, 4758 Grand Avenue, Pittsburgh 25, Pa.
Please send me information on the following products and services

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| <input type="checkbox"/> Docks, Harbors | <input type="checkbox"/> Grating |
| <input type="checkbox"/> Briquetting | <input type="checkbox"/> Space Heaters |
| <input type="checkbox"/> Pelletizing | <input type="checkbox"/> Water Intakes |
| <input type="checkbox"/> Ore Beneficiation | <input type="checkbox"/> Fabricated Piping |
| <input type="checkbox"/> Ore & Coal Unloaders | <input type="checkbox"/> Towboats, Barges |
| <input type="checkbox"/> Ore Bridges | <input type="checkbox"/> Lubrication Systems |

Name _____ Title _____
Company _____
Address _____
City _____ Zone _____ State _____

DRAVO

For primary distribution to high side of transformer: Anaconda SH-D cable. Conductors are insulated with Anaconda AB butyl for improved resistance to heat, water, ozone, aging and compression cutting. Anaconda designed rubber-cores cushion the ground wires, help prevent breaks from kinks and runovers. Exceptionally tough, abrasion-resistant neoprene jacket.

For secondary distribution from low side of transformer to power center: Anaconda Type PG or PCG cable. Precision stranding provides excellent bending and flexing properties. Insulation resists thermal overloads and aging. Special two-layer neoprene jacket, with a tough seine-twine web between layers for extra reinforcement, is highly resistant to rock-cutting, impact, slams, corrosive mine water, oil and grease.

For A-C Shuttlecars: Anaconda 3/C Flat Type G-600-V Shuttle Car Cable. Flat

ANACONDA makes an A-C CABLE for every mining operation

construction assures maximum crush resistance and easy reeling. Shaped insulation minimizes mechanical damage because phase and grounding conductors can't shift in use. Power and ground conductors specially engineered to resist bending and flexing fatigue. Color-coded neoprene insulation and neoprene jacket are compounded for toughness, heat stability and crush-resistance. Rubber-coated nylon breaker strips provide extra protection against phase-to-phase

shorts. Nylon seine-twine reinforcement gives high tensile strength.

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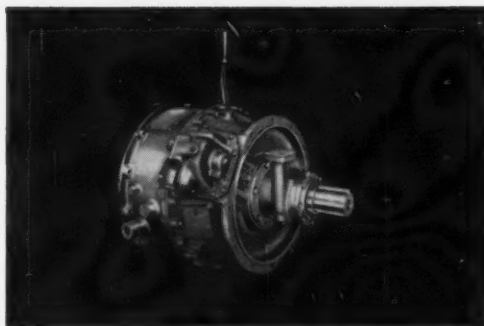
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Maintenance Ideas

If a demand-charge-type contract is in effect the metered demand might be multiplied by a like factor to obtain the billing demand. If the demand is measured in kva rather than kwhr, power-factor is automatically included because poor power-factor loads increase kva demand.

There are many ways in which power-factor is taken into consideration in figuring the final bill. But the main purpose is to penalize the consumer for poor performance.

Effects of Power Factor on System Components

The load that a power system will carry is limited by the allowable voltage drop and thermal or ampere limit of system components. When these limits have been reached or even exceeded, corrective measures are necessary. Basically, this can be accomplished by doing one of three things:

1. Increase size of conductors, transformers, regulators, switchgear, etc.
2. Add new circuits.
3. Improve power-factor.

The most economical corrective measure, normally, would be to improve power-factor by installing capacitors, assuming, of course, that the power-factor is low. This method will relieve the system of carrying kvar or magnetizing current and make available more capacity for carrying kw or work-producing power.

A lagging power-factor or an inductive kvar load is responsible for much of the voltage drop in a system. Reducing the amount of lagging kvar will confine voltage drop to the actual kw load. Electrical circuits are designed to operate within a certain voltage-drop limit. In other words, just so much voltage drop can be permitted if equipment is to operate efficiently. Installing capacitors to increase power-factor, which actually reduces lagging kvar, also reduces voltage drop due to the kvar load. Increasing the power-factor, for example, from 90% to 100% will approximately double the kw load which a system could carry and still remain within the voltage-drop limit.

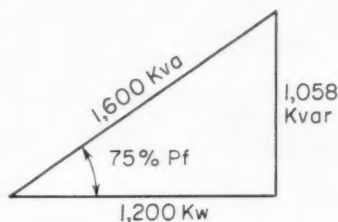
Suppose that your mine or mines, producing from 30,000 to 60,000 tons per month, have peak loads up to 1,200 kw. Without correction, the monthly power-factor is 75%. The actual kva demand at 75% pf is obtained by the formula:

$$\begin{aligned} \text{Kva demand} &= \frac{\text{kw}}{\text{pf}} = \frac{1,200}{.75} \\ &= 1,600 \text{ kva.} \end{aligned}$$

The kvar load of the system is found by the formula:

$$\begin{aligned} \text{Kvar} &= \sqrt{\text{kva}^2 - \text{kw}^2} \\ &= \sqrt{1,600^2 - 1,200^2} \\ &= \sqrt{1,120,000} \\ \text{Kva} &= 1,058 \end{aligned}$$

The geometric representation of this condition looks like this:



Now suppose you wish to raise the power factor to 95%. The kva demand will then be:

$$\begin{aligned} \text{Kva demand} &= \frac{\text{kw}}{\text{pf}} = \frac{1,200}{.95} \\ &= 1,260 \text{ kva.} \end{aligned}$$

The kvar load of the system will be reduced to:

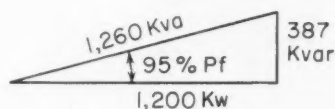
$$\begin{aligned} \text{Kvar} &= \sqrt{\text{kva}^2 - \text{kw}^2} \\ &= \sqrt{1,260^2 - 1,200^2} \\ &= \sqrt{147,600} \\ &= 387 \text{ kvar} \end{aligned}$$

Without correction the kvar load was 1,058. At 95% pf this load decreases to 387 kvar. To raise the power factor to 95%, capacitors must be added to

How to Calculate

the system to supply the necessary kvar or $1,058 - 387 = 671$ kva of capacitors.

The geometric representation of this condition looks like this:



A reduction in the kva demand from 1,600 to 1,260, will, normally, reduce demand charges (kva) and energy charges (kwhr), depending on the power contract.

What Your Savings Will Be

First, the power contract has a rate schedule for demand charges, as follows:

1st	2 kva.....	\$5.25
Next	3 kva.....	2.15
Next	25 kva.....	2.00
Next	70 kva.....	1.50
Next	200 kva.....	1.00
Next	700 kva.....	0.50
Over	1,000 kva.....	0.25

Energy charges are:

1st	1,000 kwhr.....	1.7c
	80 kwhr per kva of	
	billing demand.....	1.5c
	Additional kwhr.....	0.5c

Assume that the kwhr meter recorded 325,000 kwhr consumed per month and that the corresponding kvar-hr meter recorded 350,000 kvar-hr. The kw demand is 1,200. The billing kva demand is obtained by the following formula:

$$\begin{aligned} \text{Kva} &= \text{kw} \sqrt{1 + \left(\frac{\text{kvar-hr}}{\text{kwhr}} \right)^2} \\ &= 1,200 \sqrt{1 + \left(\frac{350,000}{325,000} \right)^2} \\ &= 1,200 \sqrt{1 + 1.076} \\ &= 1,200 \sqrt{2.076} \\ &= 1,200 \times 1.43 = 1,717 \text{ kva.} \end{aligned}$$

Power-Factor Improvements

Just how much benefit can be expected in the way of reducing power bills will depend to a great extent on the power contract. The cost of installing capacitors to improve power factor, however, must be weighed not only from the standpoint of reducing power bills

but also in releasing system capacity and improving voltage.

There are too many factors involved to make a flat prediction that the cost of installing capacitors will be returned within a definite time. However, first cost probably will be returned within 1 to 3 yr.

The capacitor has been described as a device used to add leading kvar

Power-Factor Correction

The demand charges with a 75% power-factor are:

Kva	Cost per Kva	Total Cost
2	\$5.25	\$ 5.25
3	2.15	6.45
25	2.00	50.00
70	1.50	105.00
200	1.00	200.00
700	0.50	350.00
717	0.25	179.25

1,717 \$895.95

Energy charges with a 75% power-factor are:

1st 1,000 kwhr at 1.7c....	\$ 17.00
80 × 1,717 = 137,360	
at 1.5c.....	\$2,060.40
Remainder = 187,640	
at 0.5c.....	938.20

Total energy charges.....\$3,015.60

Total demand and energy charges

= \$895.95 + \$3,015.60

= \$3,911.55.

If the power factor is increased to 95% by the addition of capacitors, what will be the yearly savings and how long will it take to pay for the capacitor installation?

Using the same kwhr consumed per month and having raised the power factor to 95%, the process of arriving at the kvar-hr reduction starts with a determination of kva-hr consumed, using this formula:

$$\text{Kva-hr} = \frac{\text{kwhr}}{\text{pf}} = \frac{325,000}{.95} = 342,105 \text{ kva-hr.}$$

Then, the kvar-hr at 95% pf will be:

$$\begin{aligned} \text{Kvar-hr} &= \sqrt{\text{kva-hr}^2 - \text{kwhr}^2} \\ &= \sqrt{342,105^2 - 325,000^2} \\ &= \sqrt{1,410,831,025} \\ &= 118,700 \text{ kvar-hr.} \end{aligned}$$

The kwhr consumed monthly remains at 325,000, but the kvar-hr consumed is reduced to 118,700.

The billing kva demand will be:

$$\begin{aligned} \text{Kva} &= 1,200 \sqrt{1 + \left(\frac{118,700}{325,000}\right)^2} \\ &= 1,200 \sqrt{1 + 0.129} \\ &= 1,200 \sqrt{1.129} \\ &= 1,200 \times 1.05 \\ &= 1,260 \text{ kva.} \end{aligned}$$

New demand charges will be:

Kva	Cost per Kva	Total Cost
2	\$5.25	\$ 5.25
3	2.15	6.45
25	2.00	50.00
70	1.50	150.00
200	1.00	200.00
700	0.50	350.00
260	0.25	65.00

1,260 \$781.95

Energy charges will be:

1st 1,000 kwhr at 1.7c....	\$ 17.00
80 × 1,260 = 100,800	
at 1.5c.....	\$1,512.00
Remainder = 223,200	
at 0.5c.....	\$1,116.00

Total energy charge.....\$2,645.00

Monthly power bill

= total energy charge + total demand charges

= \$2,645.00 + \$781.95

= \$3,426.95

Monthly demand savings

over 75% pf = \$114.00

Monthly energy savings

over 75% pf = \$370.60

Total.....\$484.60

Annual demand saving = \$1,368.00

Annual energy saving = \$4,447.20

Total saving.....= \$5,815.20

Approximate cost of capacitors will be \$4,500, which means that they will be paid for in a little over 9 mo, after which the \$484.60 per month will be clear profit. It will almost pay a man's monthly salary.

The power rate was based on a contract that considered monthly power factor. Too, only the peak demand was taken into account in figuring the required capacitor kvar. The mine load, however, varies from peak load to light loads during weekends and idle shift.

From an economical standpoint it may not be necessary to install the full value of the calculated capacitor kvar. In other words, the monthly power factor is an average for peak and light loads.

Capacitors have installation and cost advantages over other types of leading-kvar sources. They are small and can be placed at loads or load centers in convenient banks. Cost per kvar is not affected too much by the size of the bank. They can be distributed to individual loads or combined at load centers.

Capacitor Location — Capacitors

can correct circuit conditions only between themselves and the power source. Whether capacitors are installed at individual loads or grouped at the main substation depends on distribution conditions and why capacitors are being installed in the first place.

If distribution lines and transformers have ample capacity and the prime consideration is to lower the billing rate, capacitors grouped at the main substation are probably sufficient. If the problem is largely voltage drop and capacity between the main substation and loads then capacitors installed at individual loads or centers of large inductive loads probably will be required.

If most of the trouble is in motor circuits, capacitors installed at motor terminals will improve conditions to the point of purchased power.

The installation of a bank of capacitors to serve the entire distribution system will improve the power factor on the utility company's system, but will have no effect on the consumer's distribution system. The benefits would be a reduction of load on service equipment and power-factor penalty.

If capacitors are installed at individual loads, benefits will be extended to all parts of the circuit. Load and heat losses of the wiring and transformers will be reduced and voltage regulation improved.

It does not make much difference in cost per kvar whether low voltage or high-voltage capacitors are used. High-voltage capacitors, normally, are used in banks at main substations and low-voltage capacitors at individual loads. Low-voltage units carry high current and are constructed to handle large current values, increasing their cost.

Once a good power-factor is obtained it is essential that it be maintained. Power-factor changes the same as loads change. The increased use of AC power underground and increased preparation-plant capacity add to the inductive load of a system. These loads will change the power-factor and action will be necessary to bring it up to par. Periodic power-factor checks are necessary to achieve the full benefits of good power factor in the distribution system.

Degasifying Before Mining

Experiments in draining methane from Pittsburgh coal in advance of and during mining by:

Holes drilled ahead of the faces with and without water infusion to drive the gas

Vacuum exhausting through borehole from the surface

William M. Merritts, Mining Methods Research Engineer, Coal Mining Research Center, U. S. Bureau of Mines, Pittsburgh, Pa.

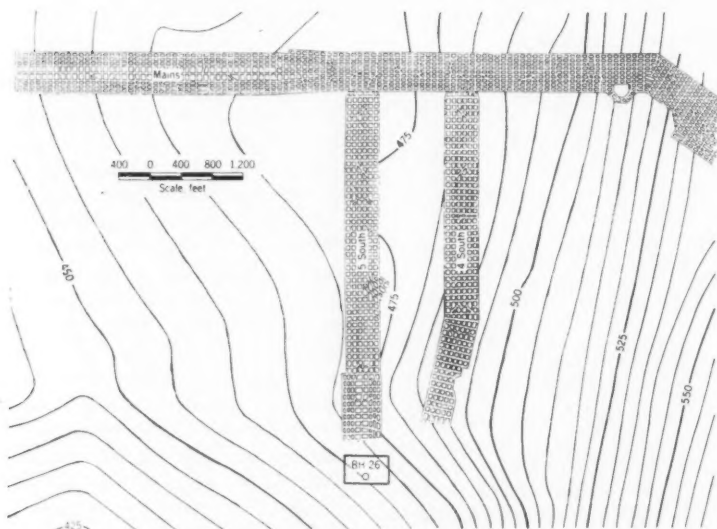
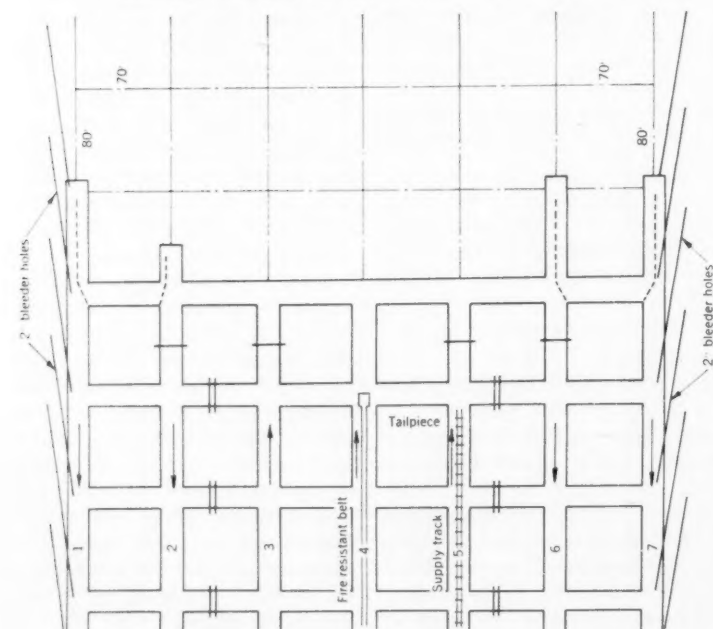


FIG. 1—WHERE DEGASIFICATION EXPERIMENTS were conducted in the Pittsburgh coal bed, showing contours at 5-ft intervals.



WATER INFUSION of the seam is the latest development in experimental work in degasifying the Pittsburgh seam at Humphrey No. 7 mine of the Christopher Coal Co., near Osage, W. Va., in advance of and during mining. Christopher has been experimenting in degasification for several years.

The Pittsburgh coal at Humphrey No. 7 is 7 to 8 ft thick and is directly overlain by several feet of shale, which usually disintegrates rapidly when exposed to air and moisture. Therefore, at least 1 ft of top coal is left to protect the immediate roof. The coal has a characteristic blocky structure as a result of well-pronounced face cleats and less-pronounced butt cleats. The butt cleats run approximately S 75 deg E, with the face cleats at approximately right angles.

In the test area of the mine the seam has two distinct binders near the top, locally referred to as the "6-Foot Binder" and "7-Foot Binder." The coal bed is intersected by numerous clay veins which usually extend over large areas. The Big Injun gas-bearing sandstone lies 1,400 ft below the Pittsburgh.

A multiple-heading-entry block system of mining is employed, using ripper-type continuous mining machines. Pillars are recovered. Fig. 1 shows the plan of mining in the area where recent degasification experiments were conducted and, also, contours on the coal bed.

Draining by Rib Holes

In driving entries into virgin coal, such as, the 4th South, 5th South and Mains, the outside heading on each side of a group has liberated more methane during mining than

FIG. 2—PATTERN AND SEQUENCE in drilling 2-in gas bleeder holes ahead of mining.

From a paper, "Recent Research in Degasifying a Coal Bed Before and During Mining," presented at the 1961 International Symposium on Mining Research sponsored by the University of Missouri School of Mines and Metallurgy and the U. S. Bureau of Mines. Complete proceedings, covering research in explosives, drilling, ore analysis, rock mechanics, roof support and other mining activities in the U. S. and abroad may be purchased from the School of Mines and Metallurgy, Rolla, Mo.

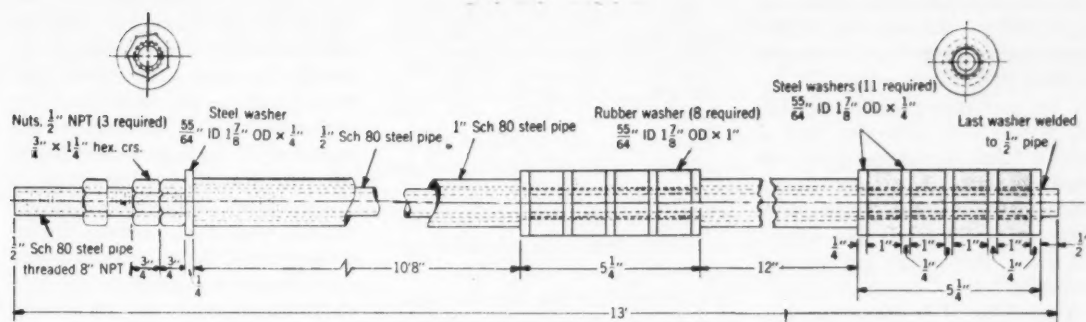


FIG. 3—WATER-INFUSION SEAL.

the others. To drain off methane from the working faces and discharge it into the return air, long horizontal bleeder boreholes were collared at the face in the solid rib of each outside heading of the group and were angled 15 deg from the direction of the entry. These holes were 2½ to 4 ft from the mine floor (Fig. 2).

The holes were drilled by a handheld drill. The drilling head was a 2-in two-prong coal bit with a 10-ft fluted auger, followed by a hollow drill stem in 10-ft sections for flushing the cuttings from the hole by a water stream. The holes ranged from 100 to 150 ft in length but a few were drilled up to 230 ft. The drilling was done through a prepared opening in an extension of the line brattice on the return-air side of the working place to direct any gas released from the hole during drilling into the return-air current. The drilling time for two men to complete two rib-line drill holes averaged about 4 hr.

Practically all rib-line holes produced methane. Liberation from about one-third of the holes was up to 90 cfm, and from the others it ranged from 90 to 135 cfm. In one hole that penetrated a clay vein at 70 ft, almost 200 cfm of methane was liberated. In this particular hole the shut-in pressure was 60 psi.

Water Infusion

The most recent research at this mine concerned the effect of water infusion on drainage of methane. In these tests, bleeder holes at the faces of outside headings and some additional holes strategically located at or near the faces of other headings were used. In development work, long holes were desir-

able for degasification purposes. Several trials were made to drill horizontal holes into the bed up to 1,000 ft in length, but none were successful. Water or water mixed with a wetting agent was forced into the holes and traveled through the coal along the cracks, cleats and bedding planes occurring naturally within the coal.

The water infusion seal used during the experiments was 13 ft long (Fig. 3). When the seal was inserted into a borehole to the desired depth and tightened, it was watertight. Turning the inby nut clockwise moved the outside pipe or tubing of the seal forward, which reduced the short space between the rubber washers and the steel washers, thereby squeezing the rubber washers firmly against the steel washers and causing them to expand outward and grip the wall of the borehole firmly.

The free end of the seal was connected by pipe fittings to a water flowmeter and a pressure gage. The assembled measuring units were connected to a 500-ft length of sectionalized ¾-in extra-heavy-duty hose attached to a wetting-agent proportioner connected to the discharge end of a high-pressure triplex plunger pump. The pump was capable of producing hydraulic pressures up to 600 psi and delivering from 11.5 to 15 gpm of water or solutions of water mixed with wetting agents. The maximum pressure required for the infusion experiments was about 150 psi. The infusion holes were sealed 3 to 8 ft from their collars.

By tracing the "sweating" of the working faces and ribs across a section during infusion, it can be established whether or not the infused water or solution is being

evenly distributed through the coal. Fluorescein dye, stabilized with an alkali, was added to the infusion water or solutions to permit positive identification of seepage from the coal surface with the aid of an approved ultraviolet lamp.

A continuous methane recorder was used to determine variations in the total methane liberations from the working section, and vacuum-bottle gas samples were collected periodically at the return regulators and the immediate returns for laboratory analyses for final check. Later in the work a dual continuous methane analyzer and recorder designed and built by the Bureau of Mines was used to analyze the intake and return air from several headings during mining operations. Other portable units used were methane indicators and testers, permissible flame safety lamps, barometers, thermometers, pitot tubes, psychrometers, oxygen and carbon-dioxide analyzers, anemometers and velometers. A recording gas orifice meter was used to register the gas flows from holes strategically located in the degasification areas of the mine.

Initial Infusion

The first water-infusion experiments were conducted in the 4th South headings, which were driven on the face cleats. This entry had been idle during the previous 3 mo because full productive capacity of the mine was not needed. The rib-line hole drilled at the face of No. 7 heading was infused with water up to 120 psi for several hours. The water injection rate was approximately 15 gpm, with added fluorescein dye stabilized with an alkali.

Seven infusions were made, using 36,400 gal and requiring a total injection time of 44 hr. The longest infusion period was about 18 hr, and the maximum pressure was 125 psi. Within 1 hr after the start of the first infusion, water seepage was noted on the coal surfaces. As infusion continued the evidence of water extended across the section and along the outside rib lines of both Nos. 1 and 7 headings.

After 8 hr of injection the percentage of methane in the right return air course dropped. However, there was an increase in the left return air course greater than the reduction in the right return. The net increase in methane emission for the entire section was 82,816 cu ft a day.

The infused water in No. 7 heading of 4th South traveled through 1,500 ft of solid coal to and across all the faces of the seven headings in the 5th South section and effectively increased the gas liberation in this adjacent section. This achievement exceeded all expectations.

The methane content measured with Riken methane-indicating detectors in the return air from the faces of 5th South at the regulators on each side was increased and decreased before, during, and after water infusion experiments in 4th South, as shown in the following tabulation:

	Right Regulator		Left Regulator	
	CFM	% CH ₄	CFM	% CH ₄
1959				
Sept.				
23..	38,000	0.05	58,000	0.05
25..	37,400	0.06	57,600	0.05
Oct.				
3..	38,000	....	57,500	0.08
5*	37,900	0.15	59,000	0.30
6..	38,400	0.06	58,650	0.05
8*	39,000	0.23	59,400	0.20
9..	39,000	0.05	57,400	0.15
14..	39,000	....	58,200	....
19*	39,800	0.10	58,200	0.18
21*	39,400	0.21	58,200	0.23
31..	39,600	....	58,000	....
Nov.				
1..	39,000	....	57,900	....

*Denotes water-infusion period in 4th South section.

During infusion of a borehole near the face of No. 7 heading, 4th South, the gas emitted from a rib borehole 25 ft outby the face increased from 15 to 20 cfm, and the analysis of the gas varied as follows:

Time	CO ₂	Percent		
		O ₂	CH ₄	N ₂
10:35 AM..	6.10	0.20	92.50	1.20
1:32 PM..	7.10	4.10	72.20	16.60
2:20 PM..	7.20	5.00	68.70	19.10
3:03 PM..	7.10	16.80	22.30	53.80
4:08 PM..	7.10	20.80	9.50	62.60

During the six infusions of the face hole in No. 1 heading of 4th South, 29,880 gal of water was injected at a maximum pressure of 50 psi. Soon after these infusions, mining in 4th South was resumed. The dye included in the injection water was detected by ultraviolet light for a distance of 1,500 ft. Face liberations in both 4th South and 5th South were reduced considerably below the normal methane liberations for the sections.

Main-Entry Infusion

Several water-infusion experiments were conducted in the main entry of the mine, consisting of nine headings driven on the butt cleats.

During the first experiment, a horizontal 100-ft rib-line hole at the face of No. 9 heading was infused for 9 hr 10 min at pressures ranging from 30 to 118 psi. Two pumps delivered about 25 gpm into the hole. A total of 13,750 gal of water was forced into the hole during this experiment. During the last half hour of the infusion period, fluorescein dye and a wetting agent were added to the infusion water, but no attempt was made to control the mixture percentage of the solution containing the wetting agent.

The infused water appeared in the headings in droplets after successive time intervals until the No. 1 heading showed effects of infusion. The horizontal 100-ft rib-line borehole at the face of No. 1 heading was discharging colored water immediately after the infusion experiment.

At the beginning of the experiment, 54,432 and 62,899 cfm of air were measured at the regulators in the right and left returns, respectively. The air analysis at the left showed an increase of 0.28% methane; at the right, an increase of 0.17% during the infusion period. Thus, the total methane liberation for the main headings as a direct result of water infusion during this experiment was 16,118.4 cu ft per hr, or, at the removal rate of excess methane from the mains, of 386,841 cu ft per day.

A second experiment was conducted in the main headings. In addition to the bleeder holes in the outside openings a horizontal hole 20 ft long was drilled between the projected 5 and 6 headings. At the beginning of the experiment, 55,556 and 44,160 cfm was measured at the regulators in the right and left returns, respectively. During the infusion period, the air analysis at the right regulator showed an increase of 0.13% methane and at the left regulator, an increase of 0.14%. Thus, the total methane liberation from the main entries as a direct result of water infusion during this experiment was 8,042.8 cu ft per hr, or at the removal rate of excess methane from the main entries of 193,028 cu ft in 24 hr.

During this experiment, one continuous-mining machine was working on the section in one of the center headings. At the beginning of the experiment the infusion pressures varied from 100 to 150 psi and it was decided that too much gas might be forced out of the faces of the solid coal if these pressures were maintained. Therefore, the infusion pressures were reduced to 50 and then later to 25 psi by throttling back the flow of water at the valve connected to the water-infusion seal.

Numerous other infusion tests were conducted in these sections at different time intervals, governed by the increased methane liberation from the face areas after previous infusions. The infusion water and solutions of wetting agents were forced into the coal at pressures ranging from 50 to 140 psi at predesignated pillars between projected center headings and in inside and outside ribs of outside entries. The total amount of methane removed from each of the sections as a result of infusion was as much as 36,455 cu ft per hr.

The areas of the sections infused with solutions of wetting agents liberated less air-borne dust during mining operations than those infused with water alone.

Borehole Drainage

In August, 1959, a power-drop borehole (No. 26, Fig. 1) was drilled 455 ft to the bottom of the Pittsburgh coal bed. The hole was

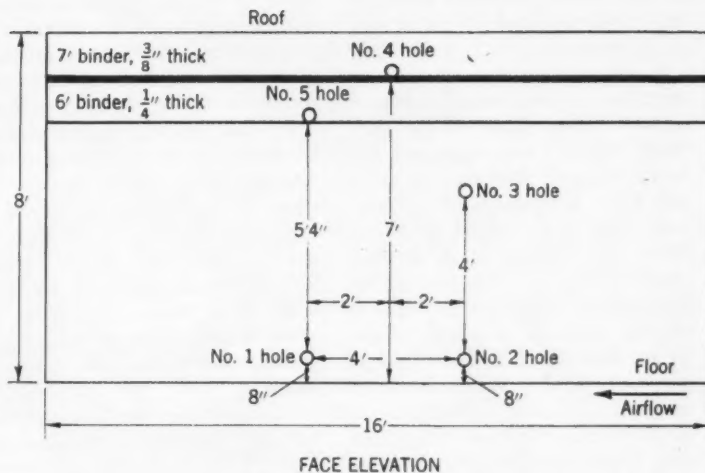
cased with 6%-in standard casing to the top of the bed and was pressure-grouted to that level before completion of drilling through the coal. The hole made both gas and water, with the gas flow shut off by a 365-ft above-bottom water column.

On Oct. 14, 1959, a bottom-hole pump was installed. The hole with the water removed from it produced about 24,000 cu ft of gas a day and developed a shut-in pressure of 28 psi. Pumping from the hole was continued and gas continued to discharge from the hole, but in steadily diminishing quantities, until Dec. 15, 1959, when a 53-cfm positive rotary vacuum pump was installed. The pump increased the gas flow from 17,000 cu ft a day to about 32,000. A larger 115-cfm vacuum pump was installed Jan. 12, 1960, and, with vacuums ranging from 7 to 12 in of mercury, the gas delivery from the hole was increased to 57,000 cu ft a day, and then to 67,000 at the greatest vacuum.

Analyses of gas samples collected during the operation of the gas vacuum pumps indicated relatively high percentages of air in the gas being pumped from the borehole. Allowing for the small volume of air being drawn into the gas pump and water pump from the atmosphere, the excessive air in the samples was considered to be coming from the ventilating currents sweeping the working faces of the approaching 5th South entries, which were about 800 ft from the borehole.

Migration Tests

To determine if mine ventilating air was passing through this 800 ft of virgin coal and diluting the gas being pumped from the bed through No. 26 borehole, a Veeco MS-9A helium leak detector (accuracy 1 part in 10 million) was installed at the surface outlet of the borehole, and helium gas was released at the face of 5th South. Continuous readings at the detector were made for several days to establish the normal helium emission from the borehole. Subsequently on different days helium was released at mine atmospheric pressure at faces of 5th South entry at four locations, and through a bleeder hole at a pressure of 50 psi. Increased



- All holes were 5 ft. deep and 2 in. in diameter.
- No. 2 hole was sealed with water-infusion seal for a depth of 2 ft. from collar.
- A cylinder of anhydrous ammonia was connected to the water-infusion seal; a valve and a pressure gage were provided in the connecting line between the cylinder and the seal.

FIG. 4—HOLE PLACEMENT for gas-migration tests.

flow of helium at the borehole was detected 2 hr after each release at mine atmosphere and within 1 hr after release under pressure.

The gas pumped from the No. 26 borehole was about 67,000 cu ft a day at the time of the helium-migration experiments, and a typical analysis of the borehole gas was:

	Percent
CO ₂	2.8
O ₂	0.2
CH ₄	94.6
N ₂	2.4

Total gas released from No. 26 borehole to May 6, 1960, when the hole was intersected at the bottom by the 5th South workings, was about 8 million cu ft.

When No. 26 borehole was liberating about 18,000 cu ft of gas a day and the hole was free from water, the shut-in pressure of the free flowing gas after 15 min of confinement was 30 psi, and after 1 hr, 100 psi. It remained at this pressure after several hours of confinement. This high pressure for boreholes was considered abnormal, but several different pressure gages gave similar results.

Drainage Tests

When No. 26 borehole was exposed underground, a 2-in horizon-

tal hole 20 ft long was drilled into the bed near the bottom of the surface borehole and between projected Nos. 4 and 5 headings, 5th South. The horizontal borehole was sealed with a water-infusion seal and connected to the bottom of the surface borehole casing.

About 2 cfm of free-flowing gas a minute traveled from the coal bed through the pipe system to the top of the borehole. The immediate left return airway contained 0.36% methane, and the immediate right return airway contained 0.42%.

When the 115-cfm vacuum pump was started, the volume of gas from the discharge pipe was about 59,000 cu ft a day, or about 40 cfm. After two days of operating the vacuum pump intermittently, methane readings taken in the immediate returns in the 5th South section indicated decreases of methane to about 0.2% on each side of the section. After two more days, the right return was free of detectable gas, and the left return contained only 0.08%.

The section was advanced steadily for 5 wk, or a distance of about 400 ft, without increasing the methane content in the returns to any appreciable extent, even though the roof of the section contained many slips during this advancement. This phenomenal decrease in methane liberation in the section

for such a long period of time cannot be substantiated by mathematical calculations.

A test to determine whether gas migration is preferentially along or across bedding planes of the Pittsburgh coal bed was conducted in a freshly exposed working face using anhydrous ammonia as the tracer. Drill holes were placed in a face driven on the face cleats as indicated in Fig. 4. It took 21 sec for the gasified anhydrous ammonia to migrate from No. 2 to No. 1 hole; 27 sec from No. 2 to No. 3; and 31 sec from No. 2 to No. 5. However, ammonia gas could not be detected in No. 4 hole. This hole was above the 7-ft binder, which also prevented infusion water from penetrating beyond it. In addition to this migration test, water with added fluorescein dye traveled along the bedding planes of the coal for a distance of 46-ft in 43 min during a water infusion experiment.

The Conclusions

As a result of observations made and data obtained during these degasification experiments, certain conclusions were drawn. However, results of similar tests in other coal beds or even in other mines in the same bed must be made to verify in these conclusions:

1. Methane could be removed in considerable quantity from the coal bed by vertical boreholes penetrating the bed in some virgin areas in advance of working faces.
2. Gas drainage from vertical boreholes with applied suction could be increased considerably as compared with free-flow conditions.
3. Gas could be drained in large quantities through horizontal boreholes drilled 100 to 230 ft deep into the bed in some virgin areas in advance of the working faces.
4. Water injected into horizontal holes originally drilled for gas drainage could increase the gas liberation from working faces and ribs in a section several times above normal liberation with injection pressures up to 50 psi and nominal flow rates of water or solutions of wetting agents.
5. Excess volumes of methane totaling 875,000 cu ft a day could be removed from the coal bed in ad-

vance of mining operations during idle periods by water infusion at pressures up to 150 psi in areas where the coal bed offers greater resistance to water-injection flows.

6. Gas drainage from horizontal boreholes about 20 ft long drilled into the bed in virgin areas in advance of the working faces could be increased—as much as 20 times in one instance—with applied suction.

7. Air-borne float dust could be reduced by water infusion of the working faces prior to mining if a wetting agent is added to the water.

8. Results of tests to determine how gas migrates in the coal bed

indicated that gas moved more readily along rather than across bedding planes.

The bureau expresses appreciation to the various officials of the mine and to others who cooperated fully with the bureau during the degasification experiments. Special thanks are due W. N. Poundstone, general superintendent, and B. A. Light, project engineer, for graciously assisting with the experiments. Acknowledgment also is made for the cooperation of the late Dean G. R. Spindler, West Virginia University School of Mines, and George W. Campbell, oil and gas research engineer for the school.

News . . . And Significance

This month in *Coal Age* you will find, if you have not already done so, a report on the experience of nine of the dozen or so mines now 100% on fire-resistant hydraulic fluids. This is news . . . and significant news. It is the first report on 100% users and gives you the answers you need to know about full-scale use of these fluids.

And 108 tons per faceman certainly is news . . . and significant news, which *Coal Age* also brought you last month. Perhaps the most significant thing of all is the fact that this record is attained with conventional loading machines. Again this feature was in that issue because *Coal Age* editors look for news value and especially significance when they are on the trail of material. If it's a new development you can expect to find it in *Coal Age* first.



A Half Century of News . . . and Significance—The October issue will mark 50 yr of *Coal Age* service to the coal industry, and as always news and significance will be the keynotes.

What will coal's markets be 10 yr from now?

What will competition be like?

What will coal be using in equipment and methods and what will it be providing in efficiency and cost?

What will coal require in management and mining manpower, and what skills will be necessary?

What kind of program should coal adopt to cash in to the maximum on the growth opportunities ahead?

All these points—all significant and all newsworthy—will be analyzed from the standpoint of maximum contribution to industry thinking and future planning.

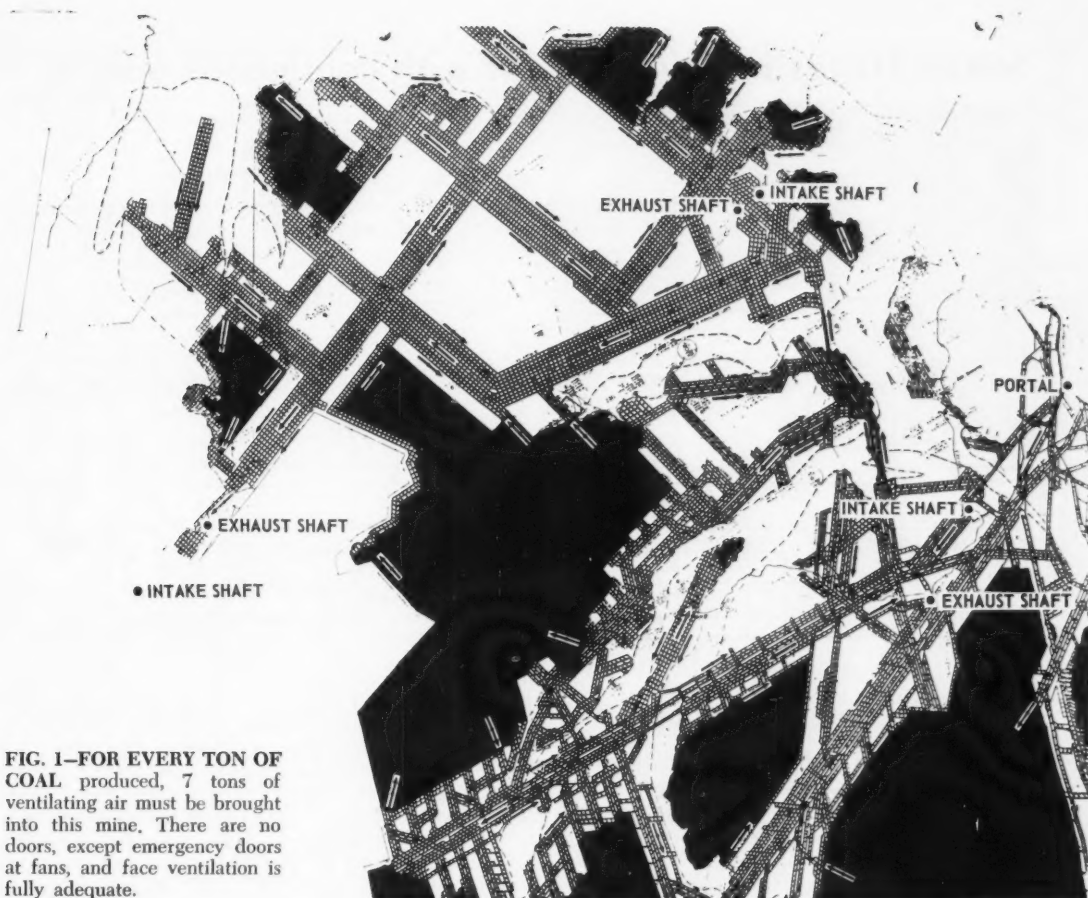


FIG. 1—FOR EVERY TON OF COAL produced, 7 tons of ventilating air must be brought into this mine. There are no doors, except emergency doors at fans, and face ventilation is fully adequate.

Separate-Split Ventilation Of Continuous-Mining Faces

- Air passes over C-M directly into return
- No check curtains in shuttle-car roadways
- Roof-bolter works in separate split.

C. W. Connor Jr., General Superintendent, Gary District, United States Steel Corp.

THE GARY DISTRICT mines of the United States Steel Corp., at Gary, W. Va., are currently operating in both the Pocahontas Nos. 3 and 4 seams. In normal operations, one of these mines, our No. 2 mine, liberates 5,000,000 cu ft of methane

From a paper presented at the 51st annual convention of the Mine Inspectors' Institute of America.

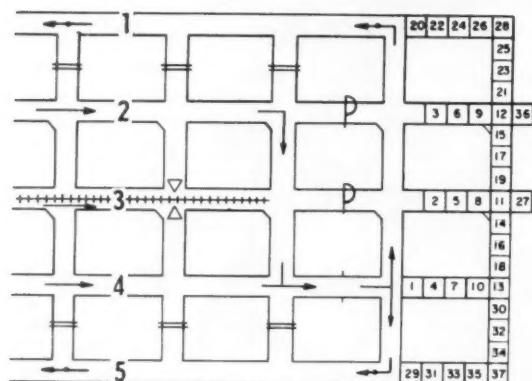
per day. Because of this liberation and the area of the mine, 1,250,000 cfm of air are circulated by three exhaust fans. Seven tons of air are circulated for every ton of coal produced.

No. 2 mine (see Fig. 1) has three exhaust fans, two active intake air shafts, and a third intake air shaft not yet in service. The intake air from the portals and intake shafts is common to all the mine. The arrows indicate the fresh air currents and their splits. The arrows with the

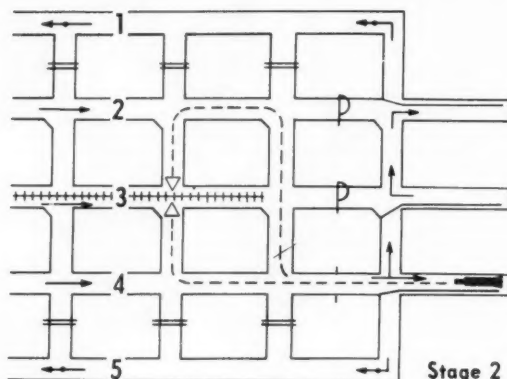
circles in the middle indicate the return air currents. Note the bleeders around the gob areas. The purpose of these bleeders is to increase the ventilating efficiency of live workings along pillar lines and to maintain unsealed mined-out areas free from accumulations of explosive or noxious gases. The large and irregular want areas aggravate the ventilation problems and the maintenance of bleeders.

No doors are used in this mine, except doors at the exhaust fans, which close automatically in the event of a fan failure. All fans are equipped with a signal system operated by the carrier-current method. Both audible and visible signals are activated at the mine shop and at

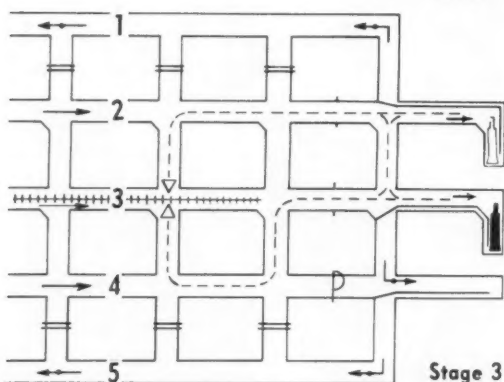
Seven stages in development with continuous miners



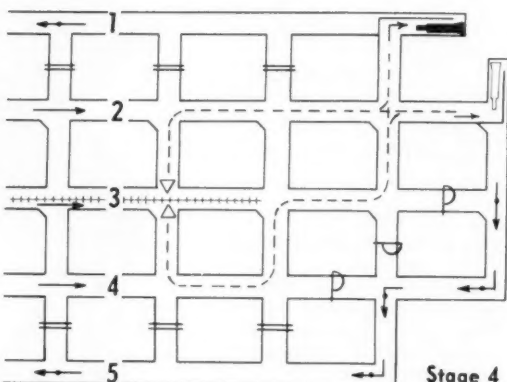
Stage 1



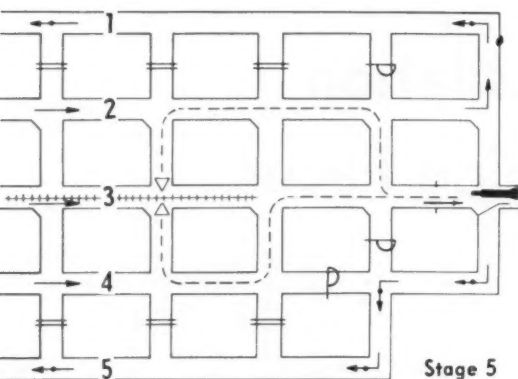
Stage 2



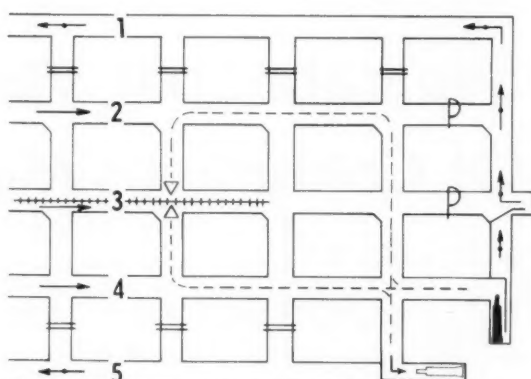
Stage 3



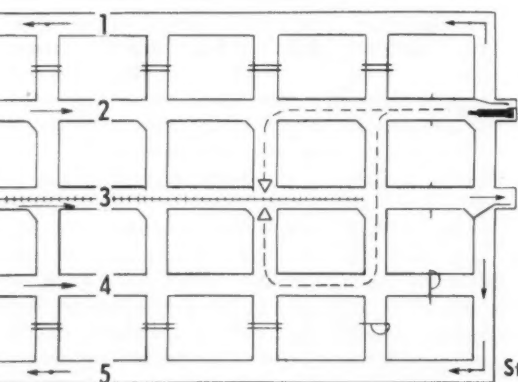
Stage 4



Stage 5



Stage 6



Stage 7

LEGEND

- Intake Air Current
- ← Return Air Current
- == Permanent Stopping
- ⌒ Plastic Check
- Plastic Line Brattice
- ▷△ Loading Point
- - - Shuttle-Car Route
- ++++ Track
- ▬ Continuous Miner
- ▬ Continuous Miner (Alternate Location)

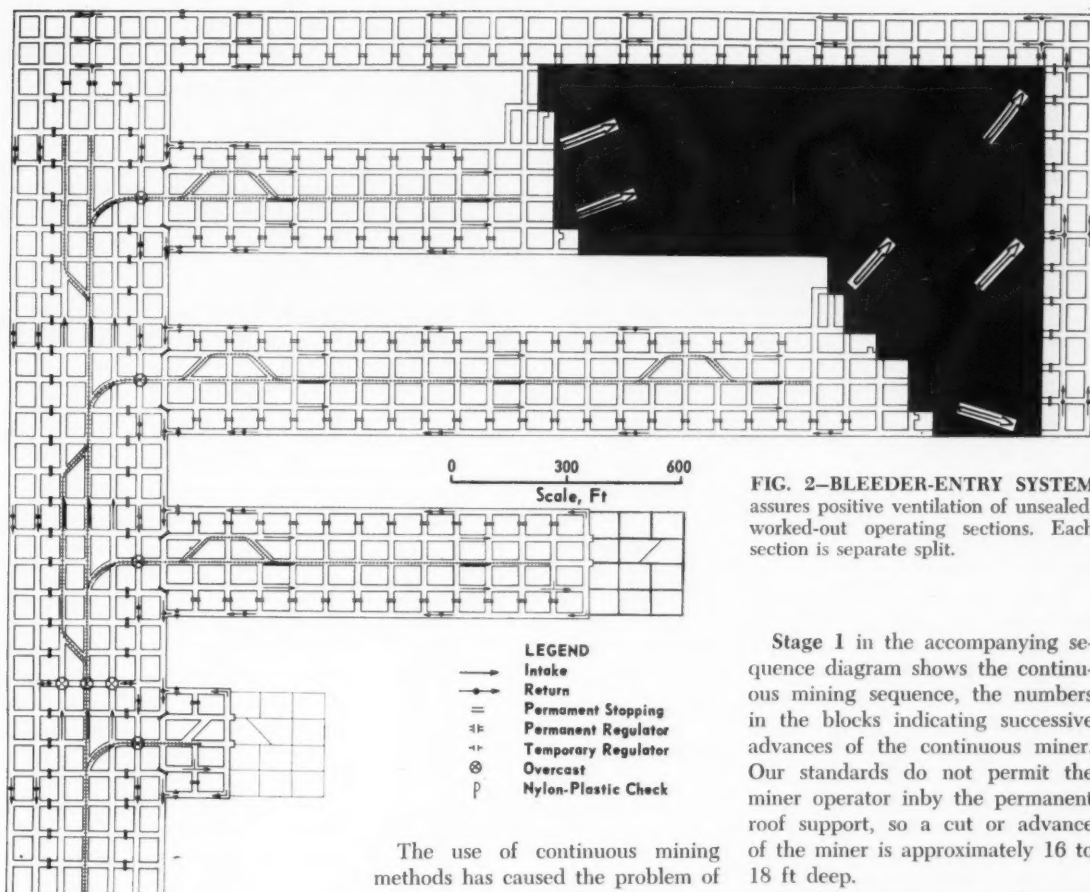


FIG. 2-BLEEDER-ENTRY SYSTEM assures positive ventilation of unsealed, worked-out operating sections. Each section is separate split.

the central power switching station in the event of a fan malfunction.

The developing sections require a minimum of 50,000 cfm to maintain the faces free of methane accumulations. Fig. 2 shows three typical operating sections in one area of the mine. Each section is on a separate split of air. The three middle entries course the fresh air, indicated by the arrows; and the air is split at the faces and returned on the flank entries, indicated by the arrows with the circles. On the two pillar sections, as shown, the direct return air is regulated near the mouth of the section, and part of the air is directed over the gob area to the bleeders and through the return air courses to the exhaust fan.

Permanent masonry ventilation seals are sprayed on the high-pressure side with a mixture of one bag of cement, seven 50-lb bags of rock dust and 26 gal of water by a slurry rock dust distributor. This method of sealing stoppings has effectively decreased air leakage.

The use of continuous mining methods has caused the problem of face ventilation to become acute. The rapid advance of the continuous miner exposes more rib for gas emission with less time for the methane to bleed off. The bulk of the continuous miner restricts the flow of air to the working face. Coal dust liberated at the face by the action of the continuous miner is difficult to fully abate with water sprays.

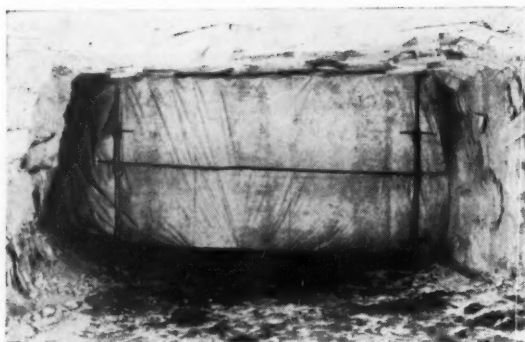
In planning to overcome these problems, the following objectives were established:

1. Ventilate the continuous miner working face with a separate split of air and course this air current directly to the return so that the liberated methane and dust would not be carried over.
2. Maintain a minimum of 8,000 cfm of air at the working face behind the line brattice.
3. Course the air over the continuous miner and return it behind the line brattice in order to keep the miner operator out of the dust zone as much as possible. This does not imply that full use is not made of dust-allaying water sprays and wetting agents.

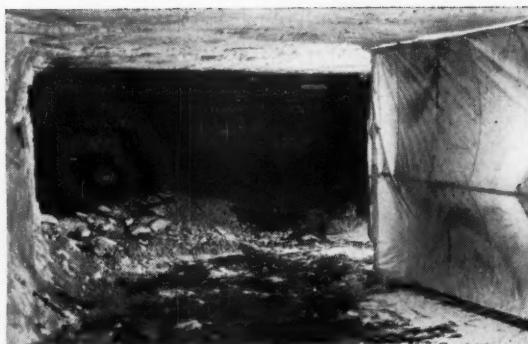
Stage 1 in the accompanying sequence diagram shows the continuous mining sequence, the numbers in the blocks indicating successive advances of the continuous miner. Our standards do not permit the miner operator in by the permanent roof support, so a cut or advance of the miner is approximately 16 to 18 ft deep.

A mining sequence to mine two or three places on cycle was developed in which a separate fresh air split is coursed over the continuous miner and directed to the return. This minimizes the use of line brattice and eliminates the necessity of shuttle cars traveling through check curtains, thereby increasing the effective use of the ventilating current at the face. The working places are driven 16 ft wide, which allows a roadway 12 ft wide and 4 ft behind the line brattice. Nylon plastic fabric has been substituted for jute brattice cloth for use as line brattice. Nylon fabric sheets are also used for temporary stoppings. The line brattice is kept ahead of the operator, thus minimizing the dust at the operator's station and sweeping the methane from the face to the return away from the machine and cables as quickly as possible.

Stage 2 shows the check curtains in place across No. 2 and No. 3 entries and the miner operating in No. 4 entry after having advanced the faces on cycle. Note that all the intake air is directed up No. 4 entry,



PLASTIC CHECKS are constructed with horizontal pipes top, bottom and center for tightness and to control billow.



SPRING-LOADED ROPES support top and bottom of line brattice at face for tightness and extensibility of curtain.

splits at the last open breakthrough, and one split is coursed over the continuous miner and directed to the right return.

Stage 3 shows the miner in No. 3 entry and after mining in No. 4 entry. The line brattice at the mouth of No. 3 entry was raised to permit the passage of the miner and then dropped. The checks across No. 2 and No. 3 entries were rolled up and fastened at the top to permit the flow of air and the travel of shuttle cars. The check across No. 4 entry was dropped. The fresh air is now coursed up No. 2 and No. 3 entries. One split of fresh air is coursed over the miner and directed to the return.

Stage 4 shows the three middle entries connected; the miner operates on cycle in No. 1 entry and No. 2 breakthrough left. In each case, the miner is on a separate fresh-air split, with the air then directed to the return.

Stage 5 shows four of the entries connected and one cut extracted from No. 3 entry on cycle. The miner is on a separate fresh air split with the air then directed to the return.

Stage 6 shows the miner operating in No. 5 entry and No. 4 breakthrough right, on cycle. In each case, a separate split of fresh air is directed over the continuous miner and thence to the return.

Stage 7 shows the miner operating in No. 2 entry, which completes one 90-ft mining and ventilation cycle.

The yellow sheets of curtain material are made of industrial nylon fabric with vinyl plastic film laminated to both sides by a heat bond-

ing process. The use of this material has greatly increased the volume of air in the face area. These yellow nylon plastic sheets are $7\frac{1}{2} \times 20$ ft and have $\frac{5}{8}$ -in grommets on 12-in centers around the perimeter, spaced 2 in from the edge.

Three 1-in pipes about 16 ft long are used in the construction of a plastic check or stopping, one each at the top, middle and bottom of the check. The top of the plastic sheet is attached to the top pipe, with wire passed through the grommets and twisted around the pipe, and the pipe is then pressed against the roof with two screw jacks about 14 ft apart. The center of the plastic check is braced with a pipe supported on hooks welded to the screw jacks. The bottom pipe is wired to the bottom of the plastic sheet. The sides of the check are attached to the rib by driving nails through the grommets into the coal.

To remove the check from use temporarily, to permit shuttle car haulage, simply take the rib nails out, use the bottom pipe as an axle, and roll up the plastic sheet and wire it to the top pipe. The horizontal middle pipe is then removed, and the roadway is cleared.

Note that construction of line brattice is similar to that of the plastic checks, with one exception: The 20-ft long section of plastic brattice nearest the face is supported at the top and bottom with $\frac{1}{2}$ -in hemp rope. This rope support is constructed by attaching two 14-ft long pieces of rope to a 1-in spring 10 in long. The rope is attached to screw jacks. This spring keeps the ropes taut and allows the plastic sheet to slide when being extended

to keep the fresh air ahead of the miner operator as the coal is extracted.

A pocket-size booklet showing the mining cycle and ventilation sequence in a step-by-step manner for both development and pillar mining was prepared and distributed to all foremen. This booklet has been invaluable as a training aid in the adoption of this mining and ventilation method.

The advantages of this plan are as follows: Check curtains on travelways are eliminated, which gives better visibility, unobstructed roadways, and the elimination of hazards present at check curtains. The continuous miner is always on a separate split of fresh air. The roof bolter is on a separate split of air 92.3% of the time. The resistance to air flow is decreased. Brattice material costs are reduced, even though the initial cost of the fabric is high.

This continuous mining cycle and ventilation plan has resulted in increased safety because of methane-free faces, unobstructed roadways, and better vision. Production has increased because the miner is not delayed waiting for methane to clear from the face. Ventilating efficiency has been increased. The air at the face has been increased from 12% to approximately 44% of the total volume available, and the air at the continuous miner operator's station has been increased approximately 400%. Where we formerly had from 2,000 to 4,000 cfm, we now have from 8,000 to 14,000 cfm. Ventilation costs have been decreased because of less air resistance and because of the long service life of nylon plastic fabric.



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Equipment Leasing

Seventeen answers to commonly asked questions on equipment leasing: what it is, how it works and what the cost and other advantages are.

Robert Sheridan
President, Nationwide Leasing Co.
Chicago 3, Ill.

1. What is the volume of equipment leasing in the coal industry?

In 1960 there was approximately \$6.7 million worth of production and office equipment leased to coal firms, a gain of 39% over 1959. This included cutting machines, conveyors, drills, dumps, loaders, materials-handling equipment, scales, office equipment and much more. There has also been an increase in leasing by coal distributors.

The main reason for the growth in leasing by coal firms has been the steady pressure for modernization and mechanization of production, which has resulted in an extreme tightness of working capital in the industry. Leasing has provided companies a means to modernize while retaining the use of their working capital. Other reasons include (1) the increasing cost of equipment, resulting from its increasing complexity and from inflation, and (2) unrealistic government depreciation schedules which penalize firms that modernize. Leasing has helped companies overcome these obstacles to growth and profitability.

2. What is the volume of leasing by American industry?

In 1960, there was approximately \$530 million worth of production equipment leased to American industry.

3. What is equipment leasing?

Equipment leasing is a method of obtaining the use of income-producing equipment (fixed assets) without capital investment. When equipment is obtained in this way for use in production, the units remain the property of the leasing company, but are used by lessee, who pays the leasing company a fixed charge for a stated period for using the equip-

ment. Leasing is a long-term arrangement, normally from 3 to 10 yr, though in some cases it may be as little as 2 yr or as long as 15. It is different from equipment *rental*, which is a short-term arrangement under which the rental firm rents out new or used pieces for brief periods, reclaims them at the end of the period, and then rents the equipment to other users.

4. How does equipment leasing work?

A company which wishes to lease equipment from a leasing company submits an application describing itself—its business, its financial position, etc. It lists the specific manufacturer from whom it wishes to secure the equipment, the price of the equipment, the length of the lease terms it desires, and the form of payment it desires. The leasing company then purchases the equipment and arranges for its shipment directly to the lessee's plant. Upon acceptance of the equipment, payments start. All equipment, no matter how many items are involved, can be covered by a single master lease and can be paid for in a single monthly payment. This is true regardless of how many suppliers are involved. This reduces the user's bookkeeping considerably.

5. What types of equipment are leased?

All types. In 1960, equipment leased ranged in cost from a \$17 hand truck (part of a \$140,000 equipment lease with a Midwestern hospital) to \$5,000,000 worth of construction equipment. Both standard and specially-built units can be leased.

6. Why has equipment leasing increased so rapidly?

Basically, equipment leasing has increased as a result of the steadily increasing cost of capital equipment.

Leasing has historically been a means of permitting businessmen to function without owning everything they need to do business, since profits are made by *using* capital equipment, rather than *owning* it. Specific reasons for the current growth of equipment leasing are:

(1) To acquire profit-producing equipment without capital investment. This is particularly important since working capital remains tight, despite the slight improvement resulting from inventory liquidation.

(2) To increase profits without increasing a company's own capital investment.

(3) To increase production without reducing liquidity of working capital.

(4) To reduce the risk of loss caused by rapid obsolescence of specialized equipment.

(5) To obtain equipment for limited-term use, either for special orders or for developmental or research work.

(6) For manufacturers of industrial equipment, leasing programs have proved to be an effective method of increasing sales.

7. What are the advantages of leasing?

Other advantages to users of leased equipment, in addition to those cited in the answer to Q. 6, lie in how leasing improves a company's financial situation.

(1) Leasing offers financing without dilution of ownership or control.

(2) In leasing, there is no necessity for a periodic cleanup of funds or a pledge of receivables.

(3) Leasing may offer certain tax-timing advantages in specific instances.

(4) Leasing makes for a cleaner balance sheet. Only the lease payments due within 12 mo appear on the balance sheet, thus affecting the ratio of current assets to current debt very little. As a result, a company is able to use its established lines of credit for short-term borrowing without disturbance.

8. What type of companies lease equipment?

All types of companies in virtually every industry today lease equip-

ment. They range in size from quite small companies (restaurants and motels, for example) to giant companies in the billion-dollar-a-year sales category. According to Nationwide Leasing's annual surveys, the 10 leading industries using leased equipment in 1960 were: aircraft and parts; chemicals and drugs; construction and road-building; electrical equipment and machinery; fabricated metal products; food products; petroleum refining; printing and publishing; pulp, paper and allied products; and the supermarket industry. This year marked the first time a nonmanufacturing industry (supermarkets) was ranked among the top users of leased equipment.

9. What is the length of equipment-lease terms?

Terms range generally from 3 to 10 year or longer, though in some cases, where smaller sums are involved, they can be as little as 2 yr. The user determines the length of lease he prefers, arranges the payments to suit his own needs. Leases are usually written on a uniform payment basis although they can be written on straight-line, declining-balance, sum-of-the-digits, or any schedule preferred by the user.

10. Is equipment leasing useful as a sales tool for manufacturers of production equipment?

In a number of industries, leasing programs have proved to be an effective method of increasing sales, through offering customers the option of purchase or lease—with the leasing company assuming the lease contract and paying the manufacturer 100% cash for the equipment when it is delivered. The leasing company sets up a complete sales-training program for the manufacturer so that his leasing plan will have a maximum impact.

11. How does leasing compare with other methods of financing?

Leasing offers 100% financing and provides the coal producer or distributor with greater cash flow than any other financing method. As a result, the relative cost of leasing is less than other methods. Any expenditure of money to acquire equipment involves paying something for the

use of the money. Even in the case of outright cash purchase, a company is sacrificing the earnings that its working cash would yield. This, in effect, is what it is "paying" for the use of its own money. If a coal company earns 31% *before-tax* profit on its *net working capital*—the industry average for the past 5 yr—this means a "cost" of 31% for using its own money.

Leasing frees more working capital immediately than any other method of obtaining equipment. This cash excess earns profits for the coal producer at his company's normal rate for the life of the lease. Over the term of the lease the additional profits produced by this cash excess (at the above average rate, for example) will be so great that the relative cost of leasing will be lower than other financing methods. (A complete analysis of the comparative cost of leasing and other financing methods, entitled "The Pros and Cons of Leasing," has been developed by the Foundation for Management Research. Single free copies of this study may be obtained by writing directly to the foundation at 121 W. Adams St., Chicago, Ill.)

12. What are recent trends in leasing?

Two new trends have shown themselves: (1) the sale-leaseback transaction (commonly, but erroneously, termed purchase-leaseback) and (2) merchandising-leasing plans involving the cooperation of equipment manufacturers and a leasing company to increase sales.

In the sale-leaseback transaction, a company builds a new plant, sells the equipment and facilities to the leasing company as soon as it is completed and ready for use, and immediately leases it back. Often this is done with older plants also. This enables firms whose financial ratios would not otherwise permit them to expand at so great a rate, to do so without straining their capital structure.

13. What operating situations make leasing most advantageous?

(1) In general, where companies can expand their operations profitably, if additional equipment and machinery was made available at smaller annual expense than through

use of their own capital for this job.

(2) Companies which find themselves short of working capital, but which have sufficient equipment, can remedy the situation through sale-leaseback transactions.

(3) Companies faced with competition using the latest equipment while they themselves lag on cost-saving. In this situation, acquiring the new equipment is essential, but often a large initial cost is prohibitive. In this situation, leasing can often provide the solution.

(4) Companies which hold a tight check rein on capital expenditures and financial ratios. Leasing permits the management of these companies to secure new equipment without forcing the board of directors to raise more capital.

(5) Where rapid obsolescence is a strong possibility, leasing by-passes the problem of capital investment in such equipment.

(6) For pilot plants, developmental or experimental projects, leasing offers a means of opening new areas of production without draining working capital on such unproved ventures.

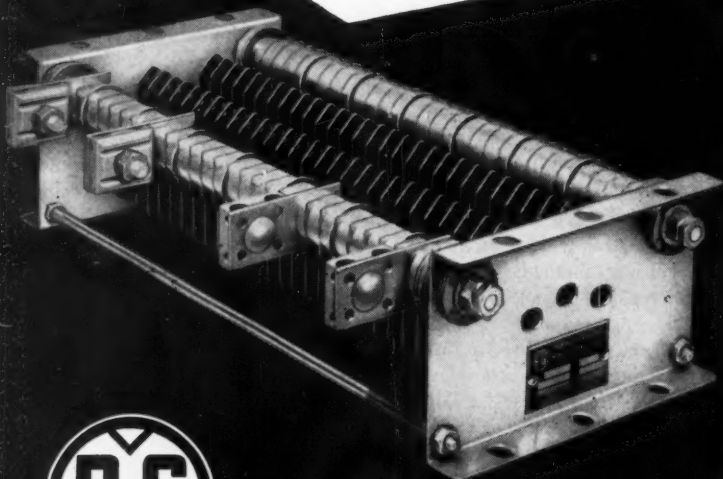
14. Do leasing agreements contain purchase options?

Yes, leasing agreements can contain purchase options. However, Nationwide Leasing advises against including purchase options in the leasing agreement. The reason is that a purchase option generally converts a leasing agreement into a conditional sales contract in the eyes of the Internal Revenue Dept. There are some exceptions to this general rule, but these exceptions are uncertain and depend on specific Internal Revenue rulings at the conclusion of the contract, many years later. For this reason, purchase options are not recommended. True lease payments, as differentiated from disguised conditional-sales contract payments, are legitimate deductions as operating expenses. Conditional-sales contracts are deductible only at the rate specified in the federal government's depreciation schedules.

15. Do leasing contracts contain renewal options?

Yes, of course. In leasing, the cost of the equipment is paid for entirely in the original leasing term. Renewal

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options are usually available at extremely low cost. They can range in length from 1-yr options to indefinite terms.

16. Does leasing offer companies tax advantages?

This has been an area of much misinformation. Leasing is not a method of tax avoidance. Its primary value lies in the way it frees working capital for other uses. In certain specific situations leasing may also offer companies advantages of tax-timing which is not to be ignored. Leasing charges are legitimately deductible as business expenses. As such, they reduce taxable income now.

Leasing may also offer a tax advantage that can be of particular importance to companies which find that their equipment tends to become obsolete much more quickly than government depreciation tables permit. For example, a company using equipment that experience shows it can expect to have to replace in 7 yr, may find that depreciation tables permit depreciation only over 15 yr. By leasing this equipment for a 7-yr period, this company would be able to deduct the full cost of the equipment from taxable income in 7 yr. If the company had purchased the equipment, it would only have used 7 yr worth of depreciation and would have to forego further depreciation benefits if it wished to replace the equipment at the end of 7 yr.

In certain sale-leaseback situations also, tax advantages may accrue, since the sale of an asset normally involves taxation at the capital gains rate, if a profit is made, rather than at the corporate rate.

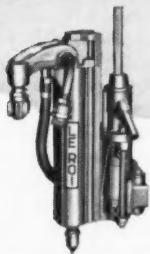
17. How can I tell if my company should lease or buy?

There is no method of financing that fits every situation equally. Factors to be judged include the availability of working capital, the rate of profit the company earns on its working capital, the effect of leasing on the company's cash flow as compared with other financing methods, the company's competitive situation, and whether there are any tax advantages in the company's special situation.

Expert advice never hurts. Check with a good leasing organization. There is no obligation.

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ours is to make it
easier and safer at
lowest cost!



S-20B "DUSTLESS" STOPER
with built-in dust-collection
Only stoper made for 26-in.
coal. Drills wherever a man
can crawl. By-passes dust
through chuck — not the ma-
chine. Snap-ring chuck chang-
ing, detachable guideways,
controls at top of feed cylin-
der. With 28-, 46-, and 64-in.
feeds, 1830 blows per minute.



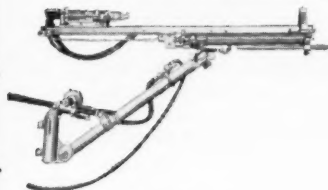
H10AL AIR LEG DRILL
a tool of many uses
Light, compact unit that can
be used as stoper, drifter, or
hand-drill. One-man opera-
tion. Has common air hose
for air leg and drill, 11 feed
pressure settings for air leg
and 4-way throttle valve, automatic controlled wet
backhead, 72-in. feed.



S-12VT STOPER
drills dry and clean
High-speed, hard-hitting
stoper with telescopic feed for
full-pressure drilling. Swoosh-
es cuttings through 5-hole bit
into hollow drill steel and out
through the chuck — not the
stoper — then into the dust
box. Eliminates stuck steel.
With 34- and 52-in. feeds.



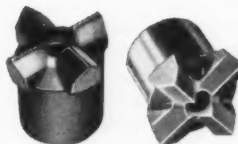
DUST COLLECTOR TANKS
only ones with B of M Approval
DK-288 — a low-volume, high-pressure
tank for Le Roi Vac-Nu-Matic® stopers
and drills. Vacuums dust from hole to
box, by-passing tool and operator.
LX-1 — a 45-lb. portable dust collector
for Le Roi Vac-Nu-Matic® stopers and
drills. Self-dumping collector can be
emptied by remote control at the drill —
keeps operator drilling hole.



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for single or gang mounting
Heavy-duty, high-speed drills
that can be mounted on jum-
bos, rigs, tractors, and trucks
— with air motor power. Air
motor and drifter can be re-
motely controlled. Steel
change to 6 ft., feed travel to
8 ft. Hydraulic jumbo arms
also available.



LO-380 LINE OILER
protects tools automatically
You'll never burn out an air
tool with the LO-380 on the
job. When oiler runs dry, it
automatically shuts off the
air. Meters oil flow at 10 to
150 psi to all parts — extends
tool life and cuts repairs.
Works in any position, and
can be filled under pressure.



CRD ONE-USE BITS
good and inexpensive
Hard-biting, long-lasting bits
for drilling in any kind of
rock. Easy on and easy off.
When dull, you can afford to
throw them away. Cost less
than sharpening and hand-
dressing conventional bits. By
far the sharpest buy at less
than "two-bits" apiece.

*Le Roi offers you the right choice
of air tools and accessories for
roof-bolting, drifting, blasthole
and exploratory drilling — in any
kind of rock. And you get the best,
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Mine Inspectors' Convention theme is . . .

Safer, More Efficient Mining

WAYS AND MEANS of reducing roof-fall accident rates, the safety situation in small mines, the use of millisecond delays in multiple shooting underground and dust control were important subjects of discussion at the 51st annual convention of the Mine Inspectors' Institute of America at Pittsburgh, Pa., June 18-21. Also of top interest to the 400 delegates attending the meetings were presentations on new concepts in firefighting, safety factors in maintenance, cable protection for off-track equipment, fire-resistant hydraulic fluids and their use, ventilating with auxiliary fans and safe methods for development and pillar recovery with continuous miners.

The MIIA was welcomed to Pittsburgh by Hon. Joseph M. Barr, mayor of the city, and by Lewis E. Evans, secretary, Pennsylvania Dept. of Mines and Mineral Industries. Responses were offered in behalf of the coal operators of the area by Dennis L. McElroy, executive vice president, Consolidation Coal Co., and George J. Steinheiser, Uniontown, Pa., the 1960-61 president of the institute.

A feature of the opening session was a description of the "Pittsburgh Renaissance," by J. T. Ryan Jr., president, Mine Safety Appliances Co., and president of the Allegheny Conference on Community Development. Using lantern slides, Mr. Ryan pointed out "before-and-after" conditions in the city of Pittsburgh with regard to smoke abatement, slum clearance, park development, cultural-center development and business-center construction.

At the closing session on Wednesday, Joseph E. Moody, president, National Coal Policy Conference, Washington, spoke on current activities of the conference in informing the public of coal's achievements and in stating the case for coal on Capitol Hill.

Abstracts of the technical-session proceedings are as follows:

Final Report on 1960 Roof-Fall Prevention Campaign, Clinton H. Hoch, staff representative, Coal Mining Section, National Safety Council, Chicago, Ill.



A total of 1,423 mines enrolled in the 1960 campaign, but only 385 mines submitted all the required reports. However, these mines showed a 25% reduction in roof-fall frequency rate while the indus-

try as a whole showed a less favorable record in 1960 than in 1959. The 25% reduction represents 35 lives saved and 228 non-fatal injuries prevented among the 385 reporting mines.

Safety may be a dull subject to some—until a relative or acquaintance becomes a victim. Then it is no longer dull. The 162 victims who lost their lives as a result of roof falls in 1960 will not have another chance to cultivate safe habits. The voluntary determination of every worker to perform in a safe manner is by far the finest contribution he can make. Safety education is the means by which men can be convinced to make this contribution.

How to Reduce Our Injury Rate From Falls of Roof and Coal — In Illinois,



George G. Guiney, mine inspector, Illinois Dept. of Mines and Minerals, Sesser, Ill.

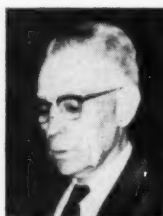
During the 8-yr period from 1945 through 1952, 676 men lost their lives in and about the mines in Illinois, 229 resulting from falls of roof and coal. In the 8-yr period from 1953 through 1960, 160 men lost their lives in Illinois, 69 of these from falls of roof and coal. Present administration of the Dept. of Mines and Minerals, upon taking office in 1953, immediately began a program of intensified mine inspection and reinspection. Findings were that roof support was not systematic in many instances and safety posts were not used to full advantage, among other shortcomings.

Consistent pressure on the part of all agencies was applied to correct these practices, and to improve roof-support

methods at intersections, in shuttle-car roadways and so on.

The result was that in 1960 fatalities in Illinois mines had been reduced to a total of 10, of which two were caused by falls of roof or coal. It is evident that if proper roof support is provided and a systematic plan is followed, the terrible toll of fatalities caused by falls or roof, rib and face can be held to a minimum. The State of Illinois is striving to achieve a fatality-free year in the mines of the state.

Preventing Roof-Fall Accidents in Indiana, C. A. Purcell, first vice president, Mine Inspectors' Institute of America, Terre Haute, Ind.



The problem is as old as the industry itself and it remains the No. 1 problem. The first thing we must learn is to distinguish bad roof from good.

One doesn't learn to do this by accident; he must be trained. The senses of sight, hearing and touch must be employed in proper roof testing to detect the bad areas. After these areas have been identified a decision must be made to take down or support the bad roof, always working from supported roof toward the unsupported—and facing the unsupported.

These rules and regulations should be made and strictly enforced, with severe penalties for noncompliance. Perhaps it would be advantageous to follow the example of the professions, in which important functions are performed by specialists. The safety director should be a specialist—responsible only to at job well done.

MIIA Officers: 1961-62

President—Robert D. Bradford, supervisor, U. S. Bureau of Mines, McAlester, Okla.

First vice president—Charles A. Purcell, Terre Haute, Ind.

Second vice president—J. A. Boyle, chief mine inspector, U. S. Steel Corp., Pittsburgh, Pa.

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Assistant secretary—Joe Mulligan, safety inspector, Semet-Solvay Div., Allied Chemical & Dye Corp., Montgomery, W. Va.

Treasurer—James H. Close, Maryland Bureau of Mines, Cumberland, Md.

Editor-in-chief—Stanley H. Mooney, safety director, Woodward Iron Co., Woodward, Ala.

Publicity editor—W. J. Schuster, St. Clairsville, Ohio.

Reducing Injury Rates From Falls of Roof in Kentucky, Robert L. Vines, senior mining engineer, Dept. of Mines and Minerals, Lexington, Ky.



Some 2,300 mines employing from four to 12 men are operating within the commonwealth, requiring a majority of the time and serv-

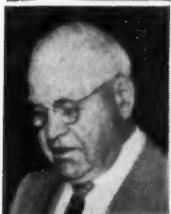
ice of the state mine inspectors. In February, 1961, the Kentucky Dept. of Mines and Minerals established a mine-safety training division for the benefit of men employed in the small truck mines, many of whom have never had the opportunity to attend accident-prevention classes.

A primary point of the instruction is to teach the men that in most of these mines the coal will be extracted from under cover that is unpredictable. Heavy timbers should be used to support new openings and extra support must be provided under special conditions. Response has been gratifying, as have the results of the training. A group of mines from which the trainees for the first class were drawn experienced a 50% reduction in total accidents, as against a comparable period in 1960, and an 85% reduction in the number of lost-time accidents.

A campaign has begun to encourage the use of roof jacks in place of posts for temporary support. New standards have been adopted concerning the size and design of pillars in portal areas. It was found that 75% of the mining problems in small mines occur within 100 ft of the opening. There are from 400 to 500 sets of new drift openings driven each year in Kentucky.

Stricter compliance with engineered mine projections has been forced through diligent inspection and mine closures for non-compliance. An application to reopen must include a telephone call to A. H. Mandt, commissioner of the Dept. of Mines and Minerals, who declares the position of the department.

Roof Safety in Oklahoma, John M. Malloy, chief inspector, Dept. of Mines, Oklahoma City, Okla.



"My own belief is that instructions or orders to adhere to an adopted minimum support pattern should have the same force and effect that any other instruction or order

given by management has regarding any other phase of the mining procedure . . .

"I believe that the minimum adopted

timbering plan should be enforced and a timber or roof support should be installed on each designated center, as required by the adopted plan, at any and all times regardless of testing, sounding and apparent condition of the roof. Then the testing and sounding should be performed to ascertain if additional timber or support is needed to make the place safe. In my opinion, much of the testing and sounding of roof constitute a device for omitting the placing of support as required by the minimum support plan."

Since mining began, over a million miners have learned too late that their tests were in error. One possible remedy is more frequent, unannounced inspections and an increase in doubling back and rechecking.

Roof-Fall Accident Prevention—In Virginia, W. F. Mullins, assistant chief mine inspector, Dept. of Labor and Industry, Commonwealth of Virginia, Big Stone Gap, Va.



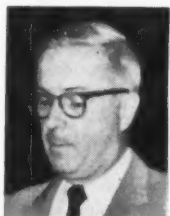
Cooperation, education and enforcement of mining law and regulations are indispensable elements in any program aimed at reducing accidents.

We must have cooperation. Safety, like everything worthwhile, must be considered by everyone in the organization. If the head of the organization does not believe in safety, the men on the job will not be safety minded.

Education is one phase of the safety program into which we have not put forth the effort we should invest. In many instances, men are hired and sent into the mine without proper instruction. This should be one of the responsibilities of foremen and mine inspectors, especially when dealing with today's small mines.

Enforcement of safety rules is an important part of the Virginia program. If corrections have not been made after a second inspection of a substandard mine, a recommendation is made to the Board of Mine Examiners that certificates be revoked.

Are Safety Regulations and Supervision Adequate for Small Mines?—What the Record Shows, M. W. A. Edwards, business economist, Bituminous Coal Operators' Association, Washington, D. C.



"What the record shows" is that fatal-injury frequency rates whether calculated

on a basis of million man-hr of exposure or million tons of coal produced, have been higher at "Title I" mines (employing 14 or less) than at the larger "Title II" mines (15 or more employees). It is the opinion of the president and of the safety director of BCOA that the inspection service at Title II mines has added materially to safety.

"Due to the hazards inherent in bituminous coal mining, we believe that all employees, regardless of the size of the mine in which they are employed, are entitled to all the safeguards that can be extended to them. This certainly includes inspection service which we have found to be associated with the lower fatal-injury frequency rate in Title II mines which have been receiving such inspections. Indifference to safety is completely inexcusable in a mine of any size or type—small or large, deep or strip, or auger."

(The foregoing conclusions followed the author's statistical analysis of accident records from 1953 through 1960, the period so far covered by the Federal Coal Mine Safety Act, on a national basis and for seven states producing 87% of the nation's bituminous coal.—Ed.)

Safety Education in Small Mines in Kentucky, Frank M. Heinze, assistant to the president, Turner Elkhorn Mining Co., Drift, Ky.



The state of Kentucky had over 2,500 small mines (14 or less employees) operating in 1960, employing approximately 20,000 men. This is important to the

economy of the mining areas. Tonnage figures of individual small mines may seem insignificant but the total is impressive. In fact, about one-third of the coal shipped from the Big Sandy district in eastern Kentucky is produced by small mines.

The rise in the number of small mines follows the reduction in the number of large ones within the state. The new small mine industry was conceived by mechanically-minded, unemployed miners who could not afford mechanization but who could devise their own equipment. Furthermore, in eastern Kentucky there are many small tracts of high-quality coal that do not permit of mechanized mining on a large scale.

Small mines in eastern Kentucky, for the period 1958-60, sustained a rate of 0.94 fatalities per million man-hr. The entire membership of the Big Sandy Coal Mining Institute had a rate of 1.29 fatalities per million man-hr during the same period.

Progressive steps are being taken to improve safety in the small mines by (1) upgrading supervisors through intensive

training, (2) organization of regional safety advisory committees and (3) offering monetary safety incentives in some instances. Turner Elkhorn is concerned because a number of small mines operate in tracts leased from the company.

Multiple Millisecond Delay vs Multiple Instantaneous Blasting in Alabama Coal



Mines, H. L. Meadows, chief mine inspector, Alabama By-Products Corp., Praco, Ala.

The Bureau of Mines stated, after 163 experiments at Bruceston, that short-delay multiple blasting with permissible explosives can be accomplished as safely as instantaneous or single-shot blasting, with less roof vibration, greater quantity of coal per lb of explosives and less float dust. Close supervision is required. Proper stemming and makeup of charges is the key to safe application of this short-delay technique. At Alabama By-Product mines shotfirers are provided with clay-filled dummies, and stringent rules are observed in connecting the charges—always in series. It has been found that 10% salt added to the explosives serves as a cooling agent.

With the technical assistance of the Bureau, standards have been set, as follows:

In undercut coal the nominal delay interval between successive shots or adjacent holes should not exceed 100 ms. Interval between first and last shot of a series should not exceed 500 ms.

When blasting off the solid not more than two adjacent openers of cut holes should be primed with the same delay period. Interval between succeeding rows should not be less than 50 ms nor more than 100 ms, except that in places driven to the rise the interval between cut and relief holes and between relief and trim holes should not be less than 25 ms nor more than 75 ms.

Short-delay detonators, like automobiles are safe; the people who use them can create hazards.

Multiple Shooting of Overcasts With Delay Detonators, Ernest A. Curth, mine inspector, West Virginia Dept. of Mines, Charleston, W. Va.



Men who do construction work in the mines, such as grading, brushing and building of overcasts and undercasts, were often exposed to

hazards resulting entirely from the practice of single-shot blasting. While tamp-

ing predrilled holes after prior shots they were exposed to disturbed top. There was also the possibility of blown-out holes when cracks from prior shots removed the burden. Fragmentation sometimes was not good, necessitating secondary blasting, and equipment was damaged in loading and transporting poorly fragmented rock.

In view of this situation a cooperative study of ms-delay multiple shooting was undertaken by U. S. Steel Corp., W. Va. Dept. of Mines and U. S. Bureau of Mines. A body of stipulations was set up under which the work was to be conducted, under the close inspection of state and federal officials. The first experiment in February, 1960, at Gary No. 14, consisted of shooting an overcast. The round consisted of 54 holes charged with 228 sticks of Monobel AA, or 92 lb of explosives. Short delay detonators in 25-, 50-, 75- and 100-ms intervals were used in V-cut, relief and trimmer holes. All detonators were connected in series. The shot resulted in excellent fragmentation, a minimum of concussion, greater safety for the men on the job.

During the past 15 mo 16 overcasts, a belt-loading station and two undercasts have been constructed in this manner at Gary No. 14. The actual shooting is done on idle days, always under the inspection of state and federal men.

New Concepts for Fighting Underground Fires, G. L. Alston, product line manager, Mine Safety Appliances Co., Pittsburgh, Pa.



"The Bureau of Mines reports that during the 8-yr period from July, 1952, to July, 1960, of the 399 mine fires investigated, 20% could not be extinguished by direct attack and had to be sealed." Major source of these fires is mechanical equipment, all having oil, grease, rubber and coal dust. A mining machine is an inferno minutes after ignition.

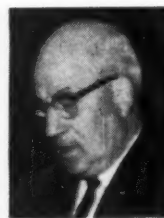
Bureau experiments show that within 4½ min. after ignition a machine is raging. Within this period the men engaged in the operation of the machine must try to get the fire under control using rock dust, water sprays, hand extinguishers and/or bagged sodium bicarbonate. As these steps are taken the secondary equipment—water cars, fire hoses, chemical extinguishers, rock-dust distributors—must be brought from normal storage areas and put into play. If these fail, the area is usually sealed.

Sodium bicarbonate, now on the market as MSA Dry Chemical in 60-lb bags, can be used in different ways. Sacks may be stored on mining machines, to be slit

and distributed on fires as soon as possible. The addition of 8% sodium bicarbonate to water increases the extinguishing ability of the water by a factor of 2.4, or 240%.

Also offered is a portable foam generator that can be classed as secondary fire-fighting equipment. It can be used to project foam into a deadend entry. The unit consists of an axial-vane fan on a rubber-tired truck with the necessary air ducts and foam-producing net. This unit projects the foam through as much as 250 ft of 24-in tubing to the fire.

Dust Study Program by Pennsylvania Dept. of Mines and Mineral Industries,



Roger J. Howell, mining engineer, Dept. Of Mines and Mineral Industries, Wilkes-Barre, Pa.

Pennsylvania statutes require that miners in anthracite and bituminous mines in the state be provided with clean and healthy atmospheres in which to work. The study of dust problems in Pennsylvania coal mines was recently strengthened because of the rising cost of compensation to victims of pneumoconiosis within the state. From June, 1957, through May, 1959, the cost to the state was \$21 million. The amount appropriated for the present biennium (ended May 31, 1961) is \$27 million, and this may not be enough. In view of the magnitude of these costs the burden has been shifted not onto the consumer but onto the taxpayers of the state.

It is for this reason that two certified men in anthracite and two in bituminous were appointed by Secretary Evans to make a comprehensive study of dust conditions in the mines of Pennsylvania. Dust laboratories have been set up in both fields and surveys are being conducted at all mines, and reports of the findings are going forward to all interested parties. District mine inspectors are informed of mines showing dust counts above allowable limits and they follow through with mine management in correcting the conditions.

Hazards From Float Coal Dust and How They Can Be Minimized, John Nagy,



chief, Branch of Dust Explosions, and Donald W. Mitchell, supervising mining health and safety engineer, U. S. Bureau of Mines, Pittsburgh, Pa.

In summary, the Bureau's research shows that float-

coal deposits present a special explosion hazard. Light deposits of float coal can be neutralized by maintaining 80% inert in the generalized rockdusting. A light deposit is equivalent to a dust layer on the floor about 1/50 in thick; rib-roof deposits are about 1/10 as much by weight (0.15 oz per cu ft in a cloud).

Proper rock dust application requires that the inert content be maintained on rib and roof as well as floor. A heavy deposit of rock dust on the floor does not compensate for a deficiency of inert in rib and roof dust.

When a light float dust deposit was tested, a strong igniting source producing a pronounced initial shock wave required a higher percentage of inert to arrest propagation than a weak source which did not produce an initial shock wave. With the heavier coal dust deposits (above 0.15 oz per cu ft) propagation may occur when the inert content is as high as 90% for the weak as well as for the strong source. The fine-coal dust deposited on the rib-roof surfaces appears to play a more important part in explosion propagation than the dust on the floor.

Ventilation of Faces With Auxiliary Fans, Gerald M. Martin, deputy mine inspector, and J. Lester Zimmerman, chief, Division of Mines, Ohio Dept. of Industrial Relations, Columbus, Ohio.



Permission has been granted one of the AC-powered mines in Ohio to ventilate a "Lee-Norse" section with an AC-powered auxiliary exhaust fan. The mine is working 13-ft entries into virgin coal and, as expected, large volumes of gas and dust are liberated. A certified mine foreman is present at all times.

The 5-hp Jeffrey exhaust fan is installed around the corner of the last breakthrough on the return side of the place being mined, in the total volume of air being delivered to the section (20,000 to 30,000 cfm). Of this amount the exhaust fan circulates about 6,000 cfm through 16-in reinforced tubing hung to within 6 ft of the face. In addition, some of the main current is deflected to the face, but it cannot be depended upon to be effective.

The plan is to provide 88-ft blocks between breakthroughs. The 13-ft places are advanced by making a cut 6-ft deep on the return side, extending the tubing, then making a 6-ft-deep cut on the opposite side to even up the place. This was found to be the safest way to keep the corners free of gas.

The use of the exhaust auxiliary fan

provides added benefits by improving visibility at the face and by removing the fumes of heated oil.

Sequence Development and Ventilation With Continuous Miners, C. W. Connor Jr., general superintendent, Gary District, U. S. Steel Corp., Gary, W. Va.



The ventilation system at Mine No. 2, Gary District, U. S. Steel Corp., Gary, W. Va., is designed to provide a separate

split of air to each continuous-mining face in a volume of 8,000 cfm. The intake is coursed over the machine and the air is returned behind a line brattice. Nylon fabric sheeting is used to construct line curtains and checks. These air controls are moved as required to provide the separate split to the miner and provide unobstructed shuttle-car haulage roads.

There are no doors in the mine, except those at the fans for emergency use. On most occasions the roof bolter also operates on a separate split of air. A system of bleeder entries assures positive ventilation of all old workings.

(Mr. Connor's paper appears in this issue, beginning on p 79.—Ed.)

The importance of Equipment Maintenance to Safety in Coal Mines, J. F. Wildey, director of safety and inspection, Bethlehem Mines Corp., Johnstown, Pa.



The broad program in maintenance is aimed at the elimination of all accidents, in which an accident is defined as any

incident that interrupts the normal work cycle. When equipment breaks down the tempo of the job changes and the immediate work patterns of the employees are forced to change. At these times accidents and injuries are more likely to occur.

Good housekeeping is very important. Shops are well-equipped and storage of parts and supplies is planned and controlled. A maintenance job is considered not to be finished until tools and extra parts are returned to their proper places and the work site has been cleaned up.

Communication among shift crews is facilitated through the use of special foremen's report forms. Fan monitoring is done by automatic systems, and two-way radio, where needed, also helps in the smooth control of production and maintenance.

Safer Mining Fluids, Charles A. Bailey, lubrication engineer, National Tube Div., U. S. Steel Corp., Pittsburgh, Pa.



Cleanliness is next to godliness in converting from one type of hydraulic fluid to another. No system can operate satisfactorily if it is not clean at the start and kept clean. One way to

keep systems clean is to provide ample, effective filtration.

The biggest single problem in any conversion is leakage. Internal leakage may be expected to develop in time, even under normal conditions. This may slow down a machine but it will not result in loss of fluid. External leakage is the big problem.

In cases of external leakage, the general practice has been to change to less expensive fluids. The answer to the problem might well be to change to a more expensive fluid, thus impressing people with the waste caused by leakage. Leakage at the rate of one drop a second totals 1.24 gal a day, or 513.2 a yr.

Trailing Cables (No. 1 Fire Hazard Underground) and Short-Circuit Protection for Off-Track Mining Equipment, Fred A. Williams, mine inspector-electrical, U. S. Bureau of Mines, St. Clairsville, Ohio.



Uninterrupted flow of current to high - resistance faults in DC trailing cables have

caused 155 fires of which the Bureau of Mines has record in the past 8 yr. There is in use a type of circuit breaker that will protect a trailing cable and machine from ground faults at a lower current value than the demand of the machine. The device depends upon ground-fault current flow in the grounding conductor of a Type G trailing cable. It requires ground-conductor continuity.

Ample short-circuit protection for all types of faults can be had through the use of a commercially-available electronic system. The device employs an oscillator connected across the line ahead of the main line contactors in the machine. The oscillator produces high-frequency AC within the cable itself. The high frequency signal is detected and used to energize the holding coil of the undervoltage release in the power-center circuit breaker. A change in the AC signal will cause the release to open, thus opening the breaker. Other devices are now in development to accomplish the purposes of better protection.

The West Looks Ahead

Prospect of an imminent growth period for the coal mining industry of the western states provides major theme at 57th annual convention of the Rocky Mountain Coal Mining Institute at Glenwood Springs, Colo., June 26-28.

IN ADDITION to studying the broader aspects of the industry's challenges and opportunities in the years ahead the delegates to the meetings at Glenwood Springs got down to "nuts and bolts" matters of operations and safety. Included in the technical deliberations were discussions of the use of yielding steel arches for ground control under heavy cover, and the growing use of automated functions in coal-handling at the mine.

Two of the sessions were highlighted by panel presentations on directions to be taken in improving safety and in utilizing energy resources.

A. Z. Dimitroff (mining electrical engineer, USBM, Denver), the 1961 president of RMCMI, keynoted the proceedings by pointing out that the question "Where do we go from here?" need not be approached in despair, since careful forward planning would make it possible for the coal industry of the West to capitalize on virtually-unlimited reserves of fuel in a growing, rapidly-developing region.

"Let me state for the cynics what the UMW thinks of the coal industry, what we think the future will hold for the industry and the role that the union intends to play in that future," declared Thomas Kennedy, president, United Mine Workers of America, in his address at the opening session. Mr. Kennedy was introduced by Edward G. Fox, president, Bituminous Coal Operators Association, Washington, D. C.

Coal is undoubtedly the largest single mineral resource within continental United States, Mr. Kennedy said, in pointing out that coal reserves are spread over the country and are readily available to any industry seeking a cheap, reliable source of energy. A major strength of the industry is its advanced technology, which has contributed to a remarkable growth in productivity while maintaining price stability.

Other important elements contributing to stability are the wage agreements which were arrived at under free collective bargaining and are in keeping with the policy of improved labor-management relations in the coal industry.

These are the basic strengths for the future, Mr. Kennedy declared. The UMW regards as a province of the union the marketing and sales structure of the

Officers of Rocky Mountain Coal Mining Institute, 1961-62

President—Charles M. Schloss, Schloss & Shubart, Inc., Denver. Vice presidents—For Colorado, **L. M. Cooley**, Edna Coal Co., Denver; for Montana, **Victor Forstrom**, Johnson Coal Co., Roundup; for New Mexico, **Wilmer Wright**, Kaiser Steel Corp., Raton; for Utah, **John T. Maulsby**, United States Steel Corp., Dragerton; for Wyoming, **Mike Zakotnik Jr.**, Kemmerer Coal Co., Frontier.

Secretary-treasurer—Fred W. Whiteside, consulting engineer, Denver.

Executive board — Mr. Whiteside, chairman, **C. Arthur Carlson**, **H. B. Crandell**, **G. C. Davis**, **A. Z. Dimitroff**, **W. K. Dennison**, **A. B. Foulger**, **R. L. Hair**, **J. R. Kastler**, **Fred W. Koelling**, **V. O. Murray**, **John Peperakis**, **Gomer Reese**, **G. M. Shott**, **G. E. Sorensen**, **R. M. von Storch**, **R. R. Williams Jr.**

coal industry, and will engage in legitimate activities to promote increased utilization of coal. The union also is active in conducting market research and promoting technical research.

It must be evident that the UMW believes strongly in the future of the coal industry, Mr. Kennedy stated. One of the first steps that must be taken to help coal is a policy statement by the Government of the United States that it regards the domestic coal industry as essential to the survival of the Nation, and that the government will do what is necessary to assure equal competitive opportunities for coal. The best possible way to do this is to establish a National Fuels Policy. This should be an objective study, aimed at intelligent conservation of all fuel resources.

There is also a social problem facing the nation in that the economic order has outstripped the social order. The price of automation is paid by men who find themselves worthless at an early age. Society should assume part of the burden by taking care of the unemployed for the full period of their unemployment.

"The coal industry in the United States is a growth industry with a potential

growth of more than 50% in this decade," predicted J. R. Forsythe, general manager, Keystone Coal Buyers Manual (a Coal Age affiliate), in his analysis of changing trends. Leadoff speaker at the second session, Mr. Forsythe pointed out that the West will lead in tonnage gains, in infiltrating gas territory and in helping create new markets for other expanding industries. Basic reasons for this bright potential are (1) coal's tremendous reserves in accessible places and (2) coal's tremendous record in increasing production efficiency and in stabilizing prices.

Potentials for the Rocky Mountain region include the following:

1. Coke from non-coking coal is a distinct possibility in the near future because of the price of eastern coke.

2. Direct reduction processes for steel use coal in the mix in the electric furnace, any grade and any size of coal. Coal may also be used to generate the required electricity, although first applications may be energized by government-developed hydro power.

3. Conversion of salt water requires large amounts of electricity. The potential in this area is truly enormous.

The growth of steel producing capacity all over the world portends a need for 30 to 40 million tons of coking coal annually. This could mean an export level of 50 to 60 million tons of coal annually in this decade.

Coal will emerge as one of the basic attractions for new plants and new industries. Many plants will move into or near coal fields. Coal suffered possibly the earliest and sharpest market losses in the nation. Now the industry may lead in a sharp upsurge.

The reasons are significant, because they are basically the same reasons that favored oil and gas when they infiltrated coal's markets. They are price and technology.

The scissoring effect of price trends—gas up, coal stable or down—plus volume freight rates on direct mainline hauls, plus developing technology in high-voltage lines with consequent widening in the choice of plant-location sites, plus the potentials in pipelines, all these have contributed to changes or reversals in fuel trends. There is significant growth in each 5-yr period ahead.

"Automation is a means of obtaining safer working conditions by reducing personnel exposure to certain operating conditions," explained Ralph B. Hammerstrom, electrical engineer, Columbia-Geneva Steel Div., U. S. Steel Corp., Dragerton, Utah, in his description of automatic controls and the impact of automation on the maintenance function.

The term "automation" at U. S. Steel's coal mines and quarries has been tempered somewhat to include the automation of part of a process or operation,

such as regulation and gage control. This control can be accomplished by indicating devices such as TV systems, thermostats, limit switches, Geiger tubes or any device that provides an impulse or signal to indicate a condition. A computing or programming circuit, which can be electric, air or hydraulic, is used to determine what the sensing device means and to translate the impulse into some kind of action.

The programming system controls a device that performs the desired action. This device could be a motor starter, air cylinder, etc. This in a nutshell is automation.

The secret of maintenance in an automated function is to choose the components with special care. For example, proximity switches and magnetic switches have longer life than mechanical switches. Transistors are more trouble-free than electron tubes.

Some of the automatic devices in use at Columbia-Geneva properties are:

Continuous bin-level indication at the wet-coal bin ahead of a fluid-bed dryer is provided by an AccuRay system. Full consideration has been given to safety in operation by preventing access to the bin with the radiation source exposed. Maintenance of the system is relatively simple, consisting primarily of unit-replacement in the event of malfunction.

The Columbia coal-mine tippie is equipped for automatic car loading, using a Westinghouse Cypak static-switching package. The automated functions are performed by magnetic proximity switches. The loading function is monitored by closed-circuit television. Maintenance since July, 1959, when the system was placed in operation, has consisted of replacing one proximity switch, Mr. Hammerstrom reported.

Energy—Its Origins

R. R. Williams Jr., manager of mines, Colorado Fuel & Iron Corp., Pueblo, Colo., was moderator of a panel on the subject of "Where do we go from here for energy?" Panel members were Emerson Jones, Consumers Public Power District, Lincoln, Nebr.; Bruce T. MacCannon, superintendent, Gas Supply Dept., Public Service Co. of Colorado, Denver, and Stephen F. Dunn, president, National Coal Association, Washington, D. C.

"The dominant characteristic of the 20th century has been a rapidly multiplying appetite for energy developed by the national economy," Mr. Dunn said in pointing out that even the Atomic Energy Commission predicts that consumption of fossil fuels will increase five-fold in this century.

The staff at the recent convention of the National Coal Association (see *Coal Age*, July, 1961, p 114) presented a plan for increasing annual coal production to 500 million tons in the U. S.

The program is aimed specifically at some particular markets for heat energy, one of which is industrial process heat. Coal has a minority share of this market. There is considerable potential for coal in small and medium steam plants. A market study shows the equivalent of 140 million tons of new coal consumption in this area by 1967.

To capture a larger share of this market, we need improved equipment, completely automatic, furnished by a single supplier and adequately serviced. Research can develop this equipment.

For all these markets we need strong public relations efforts, and finally what is needed is an aggressive sales and promotion program. This is not a task for NCA alone but for every segment of the coal industry. Where do we go for energy? We go to coal, Mr. Dunn concluded.

Yielding Supports

"The control of roof and bounces has been the most serious problem facing the deep mining of coal at Sunnyside, Utah," was the opening statement of John Peperakis, manager, Sunnyside operations, Kaiser Steel Corp., in his detailed description of how yielding steel arches and backfilling have been of considerable help in maintaining openings. Following a particularly active period of ground tremors, bounces and ground movement in 1955-56, involving serious accidents and great damage to workings, a major project of securing vital haulageways and aircourses with yieldable arches was taken up in December, 1957. Simultaneously, a supply of coke breeze was made available for backfilling until equipment could be installed for the reduction of 6x0 washery refuse to minus 8-mesh sand for use as a hydraulic backfilling material.

To date 18 mi of motor roads, hoistways, manways, aircourses and other workings have been lined with yieldable arches, and 350,000 tons of backfilling material has been hydraulically transported and placed. Current placement of fill is now running close to 1,000 tons of solids per day. Where backfilling has been completed in slope areas there have been no bounces. These areas formerly were subject to numerous and violent bounces.

The work at Sunnyside has been used to advantage in three types of operations:

1. Filling obsolete entries and worked-out pillar areas to consolidate support and stabilize ground movement in regions of permanence, such as main slopes and aircourses.
2. Stowing fill over yielding steel arches, which have been properly lagged, an operation which is comparatively fast and efficient since the new crushing facilities have been available.
3. Use of the fill plug or seal to iso-

late worked-out or possible fire areas.

Stability of the workings as a result of these ground-control methods has returned dividends in better ventilation, higher recovery and increased safety, Mr. Peperakis said.

How small-mine operators can help themselves was the subject of a paper by James J. Diamanti, president, Carbon Fuel Co., Helper, Utah and Victor Bayer, industrial development engineer, Pacific Power & Light Co., Portland, Ore., spoke on coal utilization in steam-electric generating stations.

A Look Ahead—In Safety

A panel on mine-safety considerations was manned by Thomas Allen, chief, Colorado Coal Mine Inspection Dept., Denver; Charles Ferguson, safety director, United Mine Workers, Washington, D. C., and Emery Olsen, supervisor—mine inspection, U. S. Steel Corp., Dragerton, Utah. Moderator was James Westfield, assistant director, U. S. Bureau of Mines, Washington.

Mr. Westfield stressed the importance of mine management's responsibility in maintaining the permissibility of mining equipment. Federal inspectors are being instructed to bear down hard on this. Also, tighter discipline in the care and use of safety lamps is indicated. In fact, renewed emphasis must be exerted in preventing men from carrying smokers' articles into the mines.

Another fire hazard that has developed through the use of mechanical equipment is the use of flammable hydraulic fluids, which often make big fires out of small ones in a matter of seconds, Mr. Westfield declared. Fire resistant hydraulic fluids are available, but not one mine in the West is conducting tests with this safer fluid. And on the subject of fires, it is vital to maintain safe escapeways for use in emergency.

Improving safety in the coal mines, Mr. Westfield said, will enhance the public image of the coal industry.

Mr. Ferguson stressed attitudes toward safety. He pointed out that if the men who produce the coal are told the reasons behind changes in techniques and methods, safety as well as production will improve. Employees have every right to participate in operating decisions that affect their own lives, he said.

Mr. Allen reminded the convention that an improved safety record could not be achieved without the cooperation of all parties—labor, management, state and federal governments—working in harmony.

Mr. Olsen outlined areas in which more safety emphasis could be exerted, such as, prevention of belt-conveyor accidents, elimination of roof and rib hazards, improved control of tools on mining machines and positive lockouts on all electrical equipment.

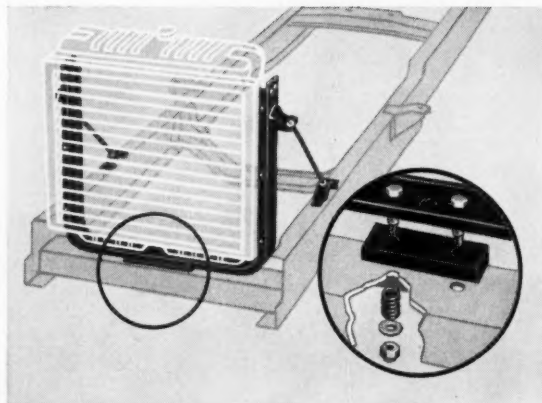


FORD HEAVY DUTY CONSTRUCTION

Ford's 1961 Heavy Duties are especially designed and built to stand up under the severe strains of off-road work. Heavier gauge steel, sturdier reinforcements and new independent mounting systems to separate radiator, fenders and cab are utilized on all heavy-duty conventional trucks, F-800 Series and up (plus all T-Series Tandems). This stronger construction with each component *individually* frame-supported doubles radiator and sheet metal life—cuts downtime and maintenance expense.

Heavier gauge metal in radiator tanks and headers resists vibration, jolts and corrosion for greater reliability. Ford's "lock-seam" radiator construction doubles the solder area at key seams for greatly increased strength and longer radiator life.

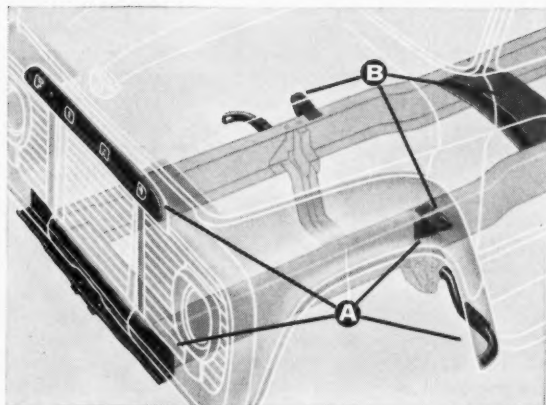
Special "horse collar" mounting of radiator (shown at right) separates it from front-end sheet metal. Resilient rubber mounting on frame cross member, shown in insert, soaks up road shocks . . . cuts wear and tear on entire cooling system. Diagonal braces at each side are attached to frame for added support.



QUALITY-BUILT...
FORD TRUCKS



DOUBLES RADIATOR, FENDER AND CAB LIFE



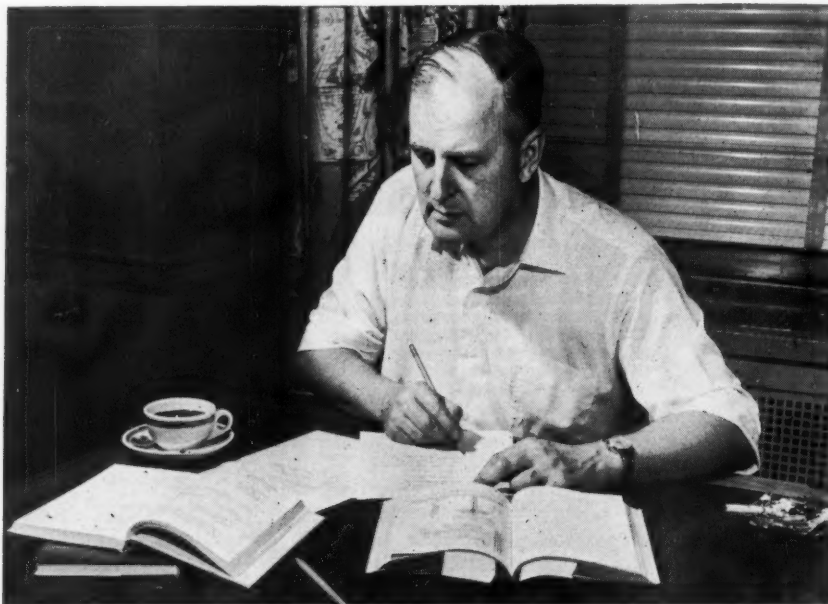
MAINTENANCE-ENGINEERED
COST LESS FORD DIVISION
Ford Motor Company,

Fender mountings, independent of both cab and grille, eliminate stress transfers for increased fender life. Each fender is assembled as a unit which includes the headlight panel and apron. The complete assembly is supported at the four points (A) as shown at left. Lower supports are on a rubber-cushioned transverse bracket at the front and a frame-mounted bracket at the rear. The upper front sections of the two fender assemblies are tied together by the nameplate panel which is independent of the center section of the grille. The upper rear support is at an angle bracket bolted to the frame. The removal of only nine bolts makes it easy to pull a fender for maximum accessibility to the engine area.

New triangular cab mounting system (B) provides increased driver comfort and greater cab durability. Two outboard front mounts, plus a centered "twin" rear mount, form a triangular system that holds the cab stationary while allowing the frame to move independently . . . reducing strain on the cab.

25% heavier gauge sheet metal in fenders, cab floor, and toeboard further increases life and provides greater resistance to corrosion.

Foremen's Forum



THE EXCEPTIONAL MAN, the dedicated man, makes things happen that promote the growth and effectiveness of a business enterprise.

Rx for Business Success: Find the Uncommon Man

"ONE UNCOMMON MAN, brought into an ailing company, can revive it and make it prosper; one unexceptional man, brought into a healthy business, can cause it to fail." So says a management expert who annually is asked to recruit hundreds of top executives for industry throughout the nation.

A recent "Conley Report," prepared for client companies by Edwin B. Conley, president, Conley Associates, Inc., Chicago executive-recruiting firm, makes the following points:

No management duty is more important than finding exceptional, uncommon men. It offers the only positive assurance of business success. There is a great fallacy abroad in the world of business: that businesses fail generally because they are undercapitalized. Businesses fail because they are undermanaged.

Capital can be obtained by the right man, new markets can be found by the right man; areas of diversification will

be found by the right man; new products will be developed by the right man; sales will be bettered by the right man; none of these things will be achieved by the wrong man.

It is paradoxical that American industry, all of which sprang out of the minds of men, often will settle more easily for an unexceptional man than for an unexceptional machine. Is management forgetting that machines, whether wrenches or computers, are only tools? Their worth depends entirely upon their utilization, to be determined by a man's decision. Equipment, like dollars, has variable value. A dollar in a university is worth more than a dollar in jail. The value of all investments lies in the use made of them, and that use is determined by man alone.

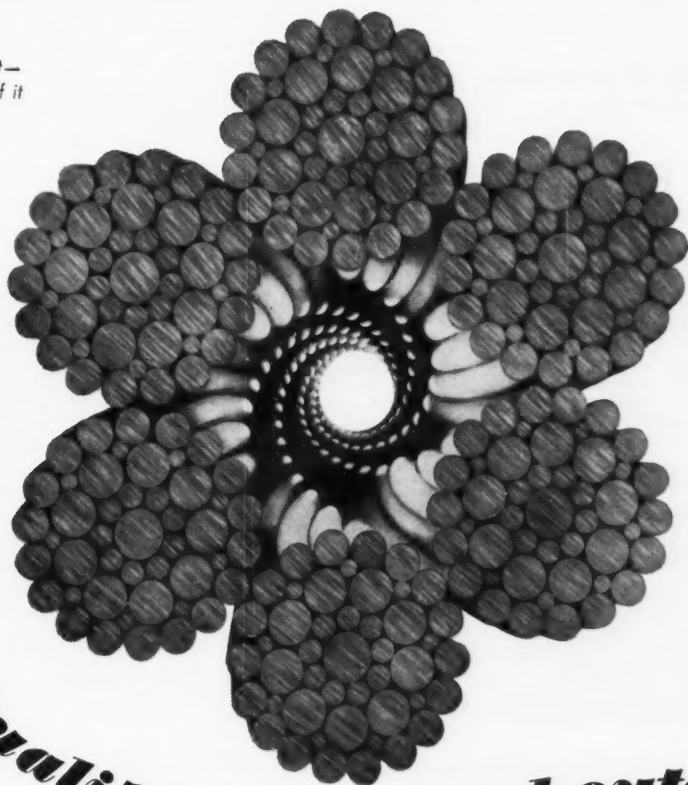
The Conley report predicts that Communism will sicken, languish and die, because its most basic error is that it fails to start with man. Societies which substitute the mass mind for the mind

that moves the mass are doomed, for they neither recognize excellence nor elevate others to it. They offer individual man no room for growth, nor the grown man room for achievement. They are like industries which employ untrained people, permit these to manage their business, and offer them no program for personal betterment. Seeing little difference among men, they are soon deprived of men of ability, and languish, having none to follow in their steps in maintaining the progress.

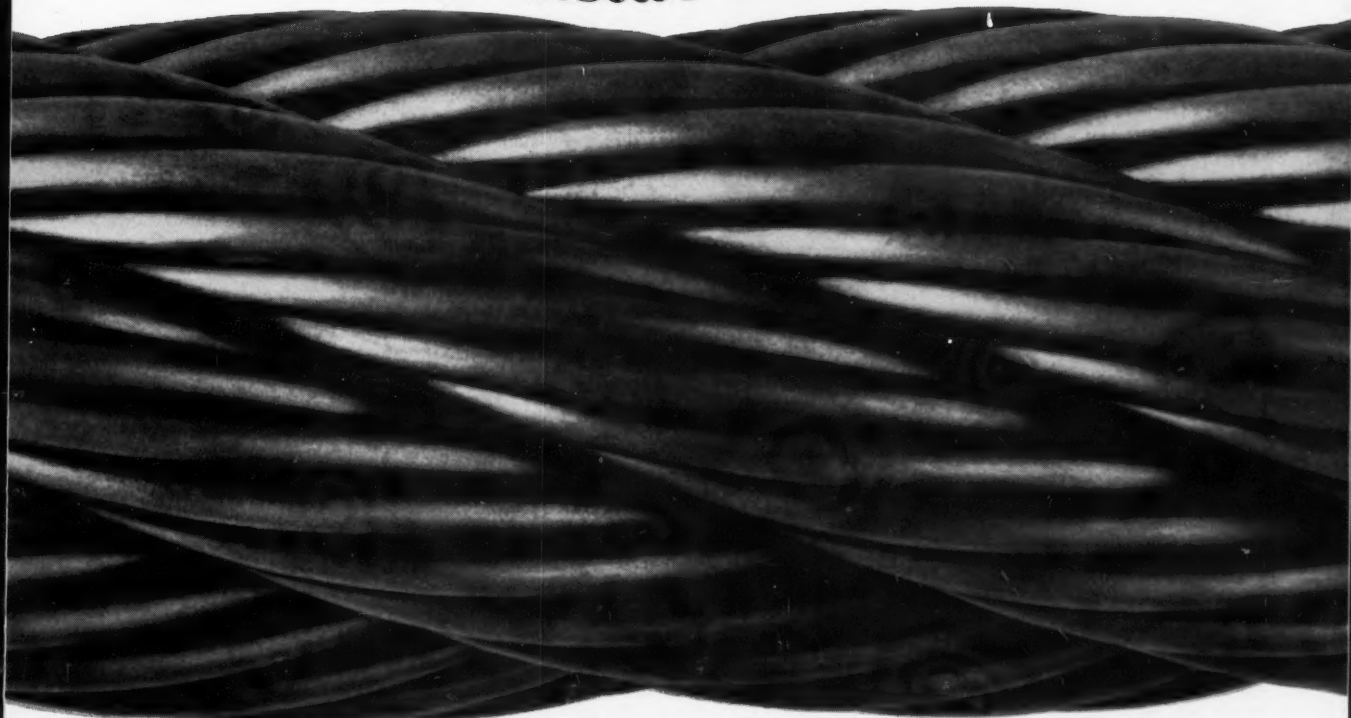
Encouraging excellence only in the pursuit of certain skills and sciences, they are soon deprived of a skilled, imaginative managerial class, and degenerate into a society of technicians deprived of direction.

All enterprises—governmental, artistic, cultural and industrial—start with a man, thrive because of the labor and dedication of other able men, and continue insofar as they are able to attract, hold, train and improve still other men.

We put a lot of work into it—
You get a lot of work out of it



Quality inside and outside



Two important angles on wire rope savings: the *quality* and *uniformity* Roebling builds all the way through Royal Blue Wire Rope. They give you a big, extra margin of service through every kind of wear and tear—and combine to make extra

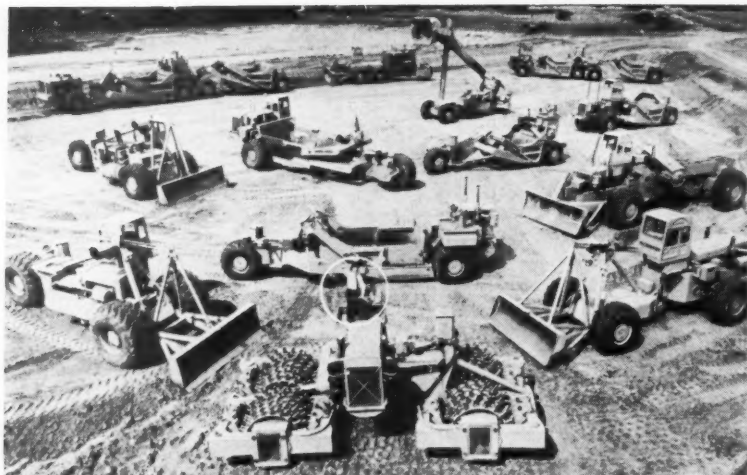
strong Roebling Royal Blue the toughest wire rope you can buy. Find out more from your wire rope distributor, or write for free booklet to Roebling's Wire Rope Division, Trenton 2, N. J.

ROEBLING



Branch Offices in Principal Cities
John A. Roebling's Sons Division
The Colorado Fuel and Iron Corp.

You'll Soon Be Seeing These . . .



That's R. G. LeTourneau . . .

pioneer in the design of earthmoving equipment, in the cab of the compactor. The other machines are mechanical innovations that brought Mr. LeTourneau three top awards recently for engineering and design. All these machines—some with eight wheels—are driven by the electric-wheel concept of power application to heavy machinery. Strip-mine foremen will no doubt have machines like this in the near future.



The Breathing Apparatus . . .

is a new extended-time system developed by A. H. Mandt (right), commissioner, Kentucky Dept. of Mines and Minerals. Mr. Mandt holds an extra oxygen mask which can be used by an injured miner while Henry Hamblin, principal inspector of mines for Kentucky, wears the rescue apparatus. The apparatus is self-contained and operates from canisters which clean and recirculate the air supply of the rescuer.

How People Grow in a Business Organization

MOORHEAD WRIGHT heads up General Electric Co.'s management research and development institute at Ossining, N. Y. He sets forth as basic to personal development in business or industry the following 10 principles:

1. The development process is a highly individual matter.
2. Every man's development in business is self-development.
3. Development cannot be based on any set of ideal traits.
4. Day-to-day work is the chief source of development.
5. Opportunity for development must be universal.
6. Today's job—not the promotional ladder—must be emphasized.
7. Managing is a separate and distinct kind of profession.
8. Decision-making practice is necessary to development.
9. The incumbent manager is responsible for development climate.
10. Moral and spiritual values are basic to development.

Get Hold of Yourself!

What a curious phenomenon it is that you can get men to die for the liberty of the world who will not make the little sacrifice that is needed to free themselves from their own individual bondage.

—Bruce Barton

We have writing and teaching, science and power; we have tamed the beasts and schooled the lightning . . . but we still have to tame ourselves. —H. G. Wells

The Big and the Small of It

TRENDS toward extra-high voltages in power transmission and toward recovery of extremely fine coal in preparation plants point up the need for expanded definitions of dimensions. Most of us are familiar with mega as a prefix that means million, as megawatts instead of thousand kilowatts. On the other end of the scale, the prefix micro means the millionth part. The U. S. Bureau of Standards has decided to go along with international recommendations that the scale be extended at both ends.

Staying with Greek symbols, the prefix for billion will be giga (pronounced jiga) and for trillion tera. Going below micro, the prefix for billionth will be nano, and for trillionth pico.

If present proclivities prevail we may find the new prefixes especially useful in describing the federal budget in terabucks and take-home pay in picocents.

Special report to users of Caterpillar equipment



Parts you can trust
...cost less per hour

New Cat parts stretch dollars "down where the digging's going on"

That's more than just talk! More and more users are conducting their own field trials of ground engaging tools—tips, bits, teeth and edges—to determine which brand gives them the best performance-cost balance. And time after time, they find that genuine Caterpillar ground engaging tools outclass

all comers—in production and over-all economy!

Take Cat cutting edges. These edges have been contractor-tested with most of the market's leading brands all over the country. Results: Cat edge wear life—10-60% longer. Cat edge cost—15-50% less per hour. Think of that in terms of dollars!

HERE'S A LOOK AT RECENT FIELD TRIALS ON SCRAPER CUTTING EDGES:

Two DW21-470 Scrapers, one with Cat *standard* edges and one with popular brand *thick* edges, were put to work "side-by-side" by a contractor in hard, red clay on an Interstate Highway job. His findings:

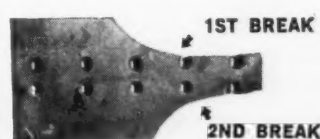
Brand	Price	Hours of Life	Cost per Hour
Other	\$121.22	1060	\$.114
Cat	\$128.28*	1360	\$.094

HIS SAVINGS WITH CAT EDGES—17.5% PER OPERATING HOUR

*Test completed before recent new low price of \$102.30 effective.



CATERPILLAR



OTHER BRAND

A Cat $\frac{3}{8}$ " stinger and another brand *one inch thick* were split in half and a section from each installed on *same* DW21-470 Scraper working in decomposed lava with embedded basaltic boulders. Other brand section broke after 48 operating hours, was reversed but broke again two hours later—a total of 50 hours of life. *Cat edge wear during period was $\frac{1}{4}$ ", other brand $\frac{1}{2}$ ".*

Your Caterpillar Dealer has the facts on many of these tests—go over them with him and start to save more now.

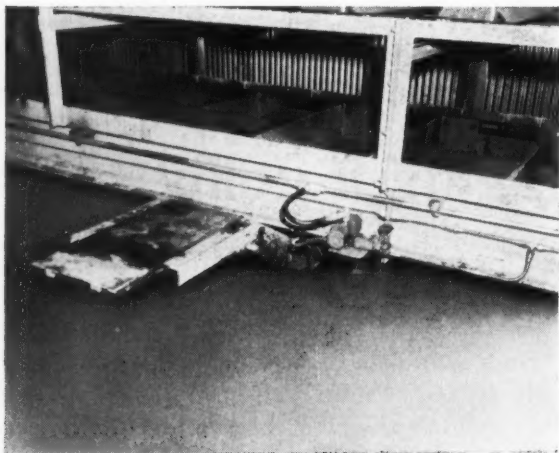
Caterpillar continually up-dates its line of ground engaging tools. Some of the newcomers to the line that "stretch your dollars" are: new self-sharpening end bits and ripper tips, patented reversible router bits, and new-design scarifier teeth for Motor Graders. These new money-savers keep production high, costs down.

Caterpillar Tractor Co., General Offices, Peoria, Illinois, U. S. A.

CATERPILLAR

Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

Operating Ideas



Remotely Controlled Gates

APPLICATION of hydraulic power makes possible simplified operation of gates in the bottom of a two-compartment mixing conveyor spanning five loading tracks at the Imperial Smokeless Coal Co., Quinwood, W. Va. One man handles loading on the five tracks from a central control tower overlooking the tracks. From this point he can operate the hydraulically powered gates and thus control delivery of coal to any one of the tracks. The remotely controlled gates make it possible to change the loading pattern easily and swiftly.

From his central position, the operator also can control five-car layer loading of $\frac{1}{4} \times 0$, $\frac{3}{4} \times 0$ and $1\frac{1}{2} \times 0$. Standard sizes loaded at Imperial Smokeless include plus $1\frac{1}{2}$ -in lump, $1\frac{1}{2} \times \frac{3}{4}$ nut, $\frac{3}{4} \times \frac{1}{4}$ pea, $\frac{1}{4} \times 0$ carbon, $1\frac{1}{2} \times 0$ nut-slack and 3.4×0 pea-slack. A full description of the Imperial cleaning plant appeared in *Coal Age*, May, 1961, p 80.

Faster Pump and Valve Changeouts

FASTER pump and valve changeouts are made possible at the Imperial Smokeless Coal Co., Quinwood, W. Va. with the aid of quick-connecting couplers. A short section of pipe with the quick-connecting couplers at each end is installed between the pump and valve near the base of the heavy-medium and dilute-medium sumps. By loosening four bolts the pump can be removed and by removing four bolts in the coupler and fourteen in one flange coupling the valve can be removed. In each instance at least 10 fewer bolts are loosened to make the change.

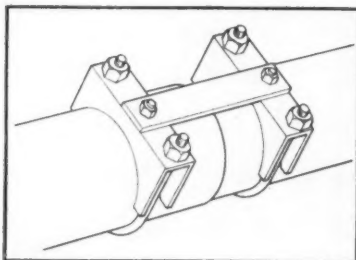
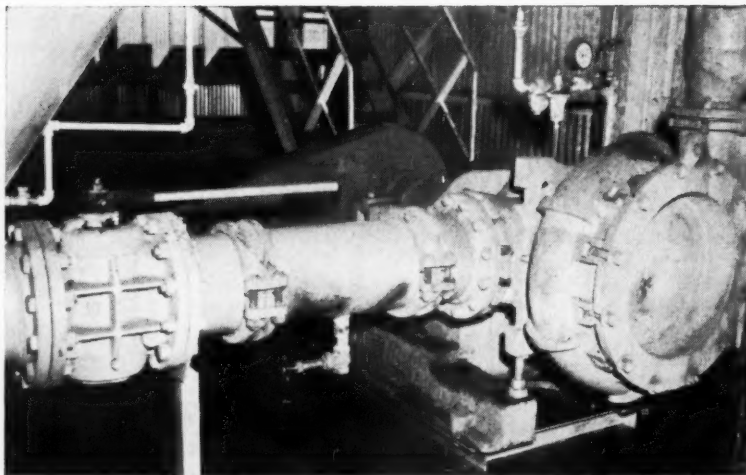


illustration shows how the special clamp idea can be used wherever two pipes too stiff for pipe clamps to hold securely are joined.

Make the special clamp from a piece of strap iron $\frac{3}{16} \times 1 \times 4$ in. Drill a hole in each end of the strap and bolt it firmly to the stamped sheet-steel cross-pieces of standard U-clamps. Then assemble the U-clamps on the two pieces of pipe.

Pipe Clamp Holds Exhaust Pipe

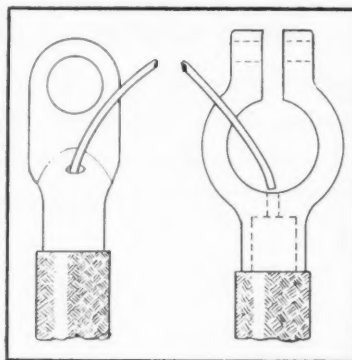
A SPECIAL CLAMP can be made to hold heavy-duty truck exhaust pipes together where one fits inside the other, reports *Fleet Owner*, another McGraw-Hill publication. The accompanying il-

Better Terminals

TERMINALS for battery and starter cables can be difficult to solder in place without burning the insulation, which leads to early failure of new cable. This idea, which appeared in *Fleet Owner*, shows one way of avoiding insulation damage.

Simply bore a $\frac{1}{8}$ -in or slightly larger

hole in the terminal. Strip the insulation from the cable and slip the terminal over the end. Heat the terminal until the rosin-core solder melts when fed through the drilled hole. This method results in neat, solid connections.

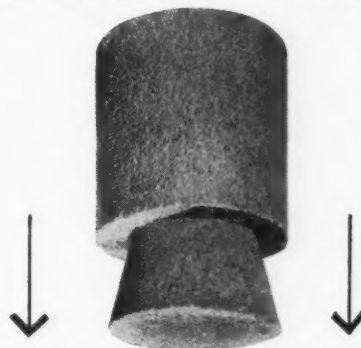


SEE **AUSTIN** FOR TIME-SAVING BLASTING PRODUCTS



AUSTIN ACP PRIMERS

Six primers, each smaller than a man's fist, designed specially for use with fertilizer grade ammonium nitrates. Very insensitive to shock and abrasion. Three types possess rifle impact sensitivity of zero . . . may be more safely removed from holes that fail to detonate. Central fuse channel, cap well, other handy features.



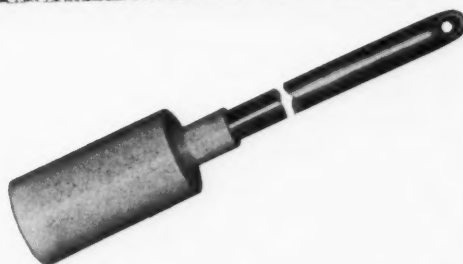
AUSTIN ATP TAMPING PLUGS

Seven cast cement plugs for tamping holes 4" to 10" in diameter. Plug is loaded cone first in hole behind the explosive. The base is tamped over the cone and seats itself solidly in the hole—tightly confining the charge. No additional stemming required.



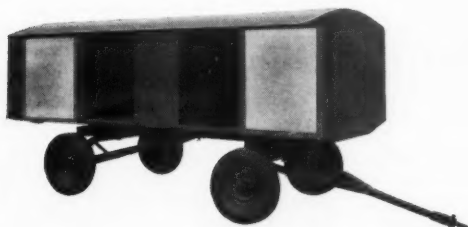
AUSTIN FUSE CONNECTORS

Provide a quick, effective detonating fuse hook-up without tying knots. Simply thread fuse from shot hole through length of connector and press trunk line into grooved slots. Then return branch through end of connector over trunk line and pull tight.



AUSTIN ALUMINUM TAMPING POLES

Strong, lightweight, non-sparking. Weigh only a fraction as much as wood. Won't warp or splinter. Special hook and eye attachments assure quick connection of extra lengths. Models for all size holes.



AUSTIN PORTABLE EXPLOSIVES MAGAZINES

Three types for hauling explosives by light truck or tractor around job sites. Made of welded steel with wood sides and tops. Masonite floors. Easy to load and unload. Designed for rugged service. Approved by state mining authorities.

A-4718A

AUSTIN POWDER COMPANY

Cleveland 13, Ohio

Please send me information about

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| <input type="checkbox"/> ACP Primers | <input type="checkbox"/> ATP Plugs |
| <input type="checkbox"/> Fuse Connectors | <input type="checkbox"/> Portable Magazines |
| <input type="checkbox"/> Aluminum Tamping Poles | |

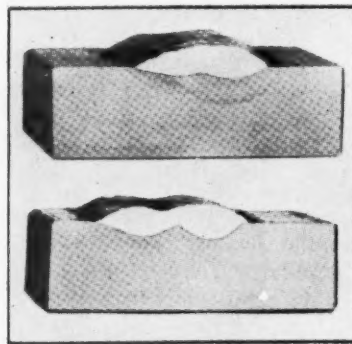
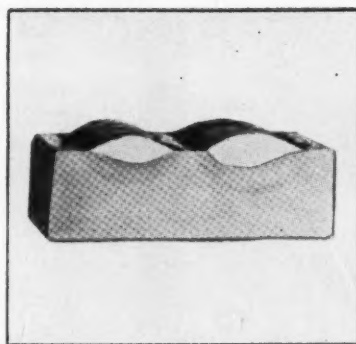
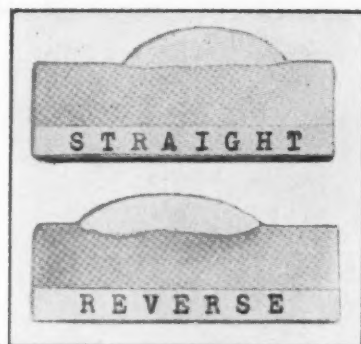
Name _____

Company _____

Address _____

City _____ State _____

Operating Ideas (Continued)



IN HARD-FACING applications, deep penetration generally is not as important as in straight fusion welding. The use of straight polarity will decrease the depth of penetration and hence the amount of base metal dilution. Hardness will be increased as much as 6 to 8 points in some materials.

THE BEAD on the left was applied at 120 amp, reverse polarity, the one on the right at 190 amp, reverse polarity. Note the difference in depth of penetration. Minimum usable amperage results in less penetration and less base metal dilution, producing greater hardness and wear resistance.

LOWER SPECIMEN shows two beads applied with a very narrow overlap. Second bead is subject to as much base metal dilution as first bead. On the upper specimen, the beads have a much closer overlap. Here the second bead is subject to much less dilution because of greater overlap.

Successful Hard-facing Application

DETERMINING the principal cause of wear and selecting the proper alloy to combat this wear are only the first two steps in hard-facing, according to *Fusion Facts*, published by the Stoddy Co. Equally important is the welding procedure used in applying the hard-facing.

In hard-facing with the electric arc, it is as important to control the welding procedure as for the manufacturer to control the analysis of his electrodes. Correct balance in electrode formulation produces necessary physical structure for abrasion and impact resistance. The control of welding variables in hard-facing determines the results. Unfortunately, sufficient attention is not always given to these important factors.

The properties and performance of a hard-facing alloy depend upon the physical structure of its deposit. The most important factors determining this structure are deposit analysis and cooling rate. The deposit analysis will determine what structures are possible to form, and the cooling rate will determine which of the possible structures are actually formed.

Proper deposit analysis depends on the design of the electrode. How the electrode is used controls the extent of dilution by the base metal. Alloy content of the deposit is an admixture of the base metal and the electrodes. Single layer applications are susceptible to the greatest dilution and therefore to the greatest variation in deposit analysis. This effect is progressively diminished by multiple-layer deposits which tend to stabilize the deposit analysis.

Generally, a two-layer deposit is recommended to overcome this dilution from the base metal. As the number of

layers increases the amount of base metal dilution decreases. As the base metal dilution decreases, the hardness of the deposit is generally raised and tends to equal that of an all-weld deposit.

A single-layer deposit, for one reason or another, is often desirable, in which case the following variables should be controlled to minimize dilution and obtain maximum hardness:

1. Lower welding currents result in less dilution.
2. If the arc is directed on a pool of molten metal, less penetration and consequently less dilution is effected.
3. A closer bead overlap results in less dilution.
4. Use of large electrodes will decrease base metal dilution.
5. Straight polarity decreases dilution.

6. Position of welding also has an effect, dilution decreasing as vertical position is reached.

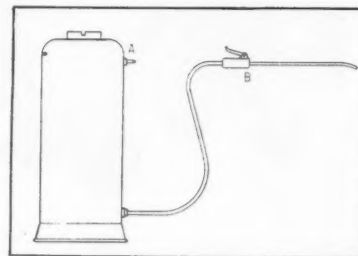
7. Effect is diminished as higher alloy materials, such as Stoddy 2134, are used.

Equally important as a satisfactory deposit analysis, is the cooling rate of the weld deposit. Cooling rates normally encountered in welding do not approach those of a water quench or furnace cool, but it is possible to change the deposit structure through uncontrolled cooling. Such things as drafts, a low or complete absence of preheat, a low interpass temperature, or throwing the just-finished hard-faced part on a cold concrete floor can accelerate the cooling rate. In so doing the hardness can be increased beyond the desirable range for the job expected of the hard metal overlay. This procedure invites excessive cracking and spalling.

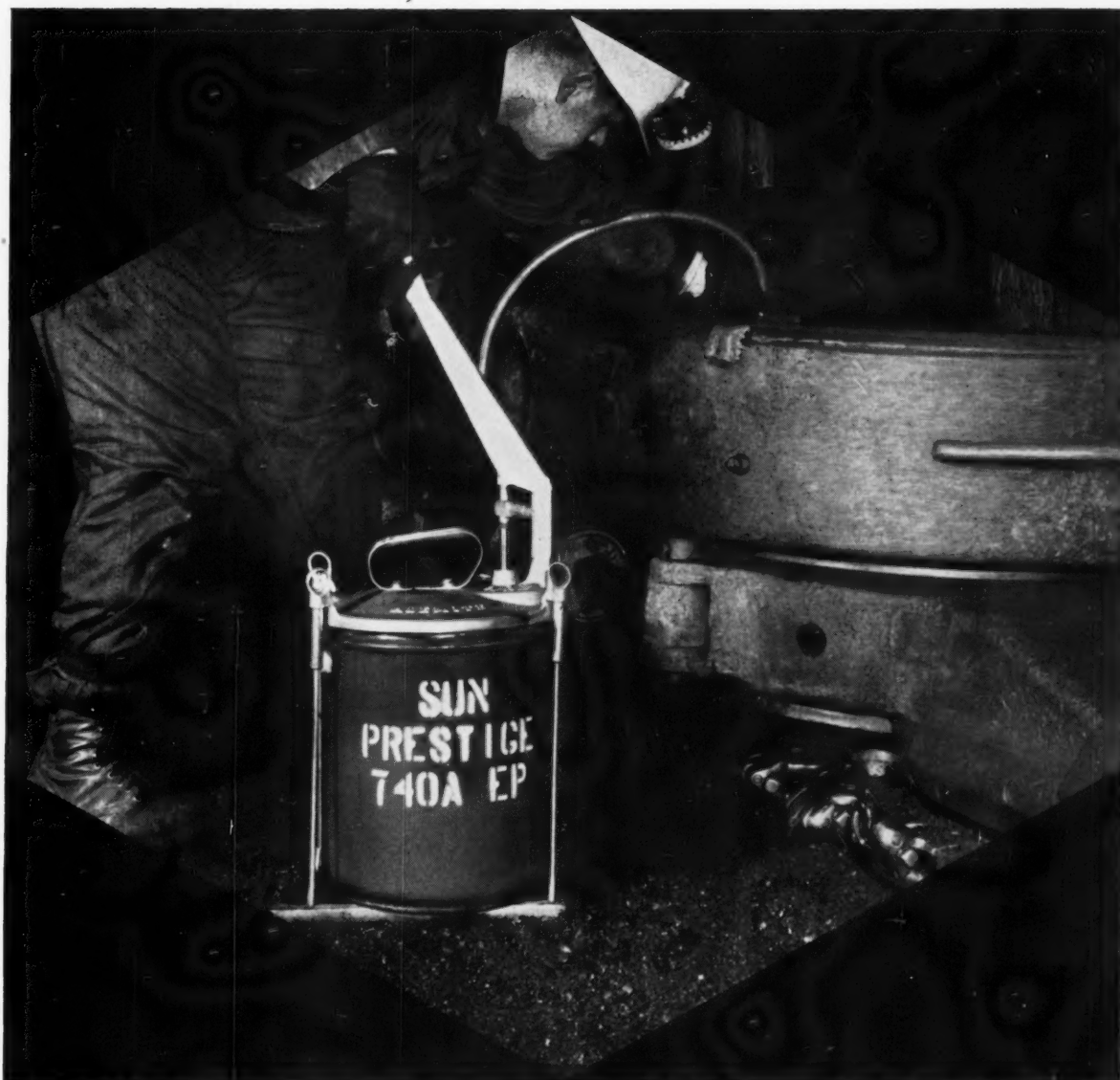
Old Extinguisher Is Lube Dispenser

A LUBE DISPENSER for filling transmissions and rear axles can be easily made from an old fire extinguisher, according to *Fleet Owner*. The conversion job takes only 30 min and eliminates the mechanical troubles sometimes experienced with filler pumps.

Make it by brazing an ordinary air valve into a $\frac{3}{4}$ -in pipe adapter. Screw the adapter into the air bottle at "A". Tap out the nozzle at the control key "B" for $\frac{3}{8}$ -in pipe threads and insert 12 in of $\frac{3}{8}$ -in steel pipe. Fill the barrel



with the proper lube, charge to 80 psi through the air valve, and store it in the garage or service truck. Compressed air forces the lube out when the valve at "B" is opened.



He's increasing tonnage, cutting costs, saving time! His Sunoco 740-A EP lubricant is teamed with just *one* Sunoco hydraulic oil (job-fitted from a full line of hydraulic oils) to meet all daily lube needs at the face! Sunoco 740-A EP clings like grease, pours like oil. It fights rust, oxidation, has extra film strength to stand up under coal dust. It's more adhesive, too, with better

load-carrying capacities. Pioneering of the basic two-product *quality* lube program by Sunoco even sparked development, in conjunction with a leading equipment manufacturer, of the well-known two-output pump shown above. It can be used with a product like 740-A EP to fill gear cases at high volume or on pressure fittings at high pressure.

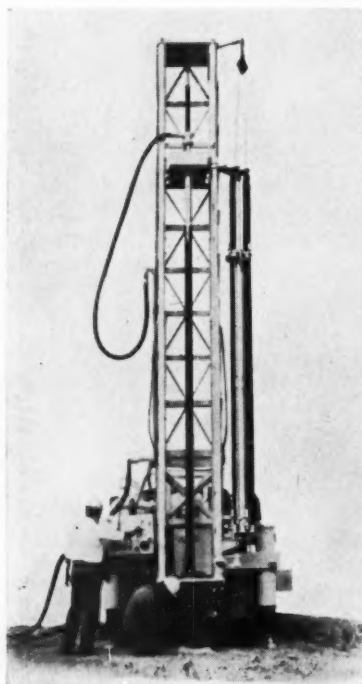
What's the difference in 2-product lube programs?



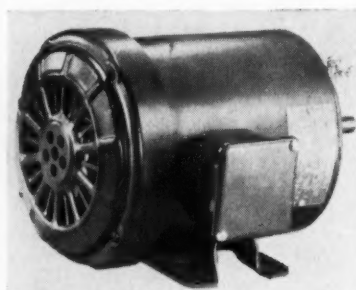
Simply this: with the Sunoco program you are assured the product quality it takes to meet all your daily needs at the face . . . *job-fitted* by men who developed the simplified lube program . . . backed by the service you have a right to expect . . . Call your Sun representative today and get squared away on real savings. Or write to: Sun Oil Company, Philadelphia 3, Pa., Dept. CA-8. In Canada: Sun Oil Company Limited, Toronto and Montreal.

PIONEERING PETROLEUM PROGRESS FOR 75 YEARS

New Equipment News



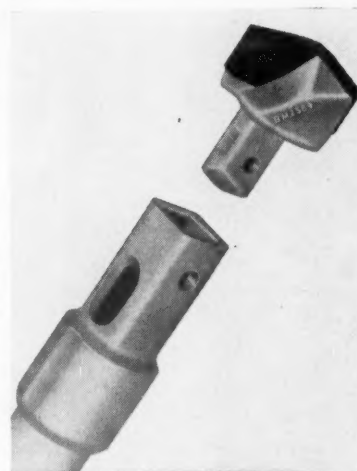
This unit is suitable for general applications and with machine tools which require continuous-duty motors in ambient conditions of dust, dirt and air-



borne abrasives. Cooling is accomplished by an outboard fan directing an air stream over the motor.

Ratings from $\frac{1}{8}$ to 1 hp in NEMA-56 frame size are available. All are rated continuous duty, 55 C rise. An optional feature on many models is all-angle sleeve or ball bearings. For additional details, write General Electric Co., Schenectady 5, N. Y.

high-speed housing is cooled to AGMA Standards by an aluminum or plastic fan of unusual design. In addition, large oil bath capacities and deep fins on both housings keep operating temperatures below a 100-deg rise above ambient. Both reductions share a common oil bath. Cleveland Worm & Gear Div., Eaton Mfg. Co., 3300 E. 80th St., Cleveland 4, Ohio.

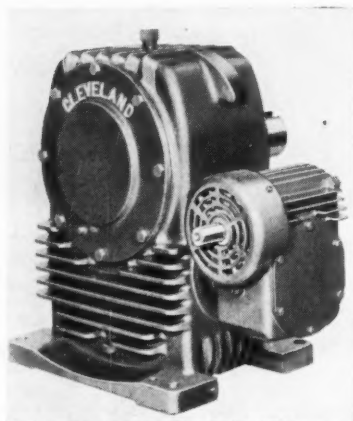


Extra-Heavy-Duty Rotary Drills

The "Strokemaster" series of extra-heavy-duty rotary drills permits a choice of either 12-, 17- or 22-ft stroke for greater flexibility in the selection of drilling tools and procedures.

All three models take rotary or down-hole tools to 500 ft in rock and NX cores from 2,000 ft, auger 24-in.-dia holes to 100 ft and perform any standard sampling or testing procedure. Twin, chain pulldowns powered by long-stroke hydraulic cylinders deliver the 6- to 12-ton ram thrust needed for fast, economical production drilling in rock and soils.

Applications range from air blast hole and shot hole drilling, to grouting, prospecting, caisson boring and soils testing. Details from Mobile Drilling, Inc., 960 N. Pennsylvania St., Indianapolis 4, Ind.



Speed Reductions to 3600:1

Reductions of up to 3600:1 have been attained by mounting a worm and gear at a 90-deg angle to another. Together with enclosed housings, the double-reduction speed reducer is available in a wide selection of ratios ranging between about 25:1 and 3600:1. Units come in seven sizes with torque capacities from about 22,700 in lb and 145,000 in lb.

Primary and secondary reduction housing are parallel to one another. And the

Internal Dust Collection Roof Drilling Combination

This USBM-approved FVH roof bit and drill steel combination has been designed for maximum dust removal without loss of drilling speed.

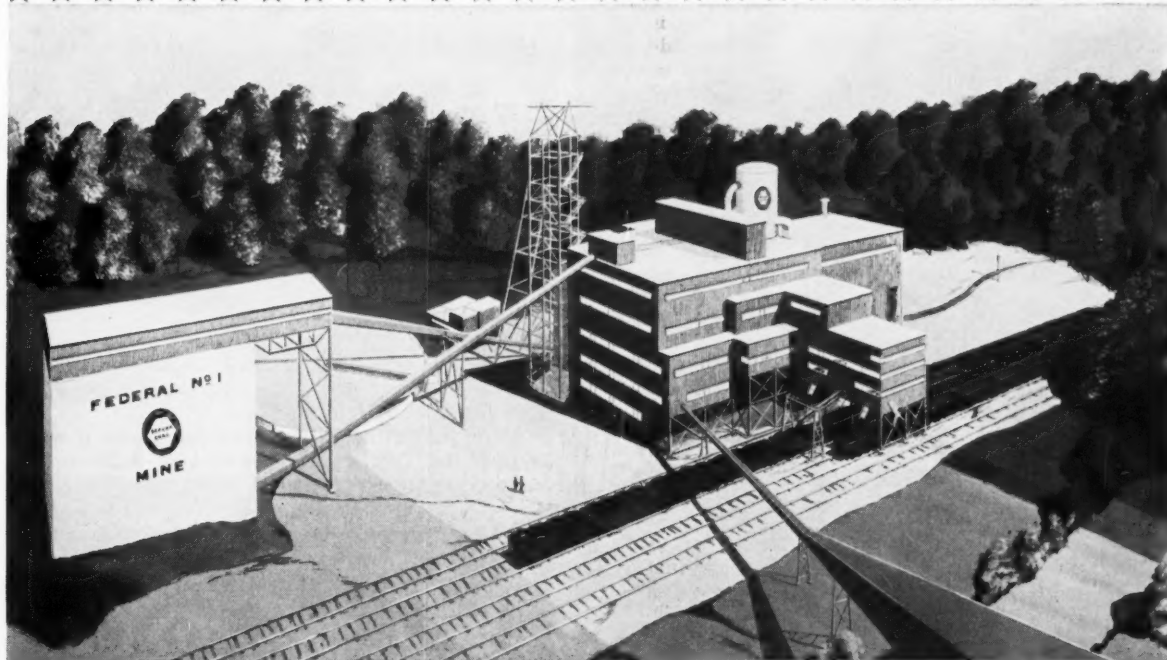
The drill steels feature heat-treated prefabricated chucks and shanks. This permits attainment of strong metallurgical properties in these components not otherwise possible. A second feature of the $\frac{1}{2}$ -in.-sq chuck is an integral collar that traps the dust in the slotted section above it, through which the dust is drawn into the hollow drill steel. Another design improvement locates the pin holes at right angles to the dust removal slots so that the pin holding the bit cannot obstruct the flow of dust or cuttings.

The bit's shorter shank and body design minimizes the distance between the point of penetration and vacuum slots, thereby assuring a short, smooth, fast flow of cuttings into the hollow steel. And longer bit life results from the carbide insert's flat bearing surface which gives it more support. Kennametal, Inc., Mining Tool Div., Bedford, Pa.

All-Enclosed Fan-Cooled Motors

Typical of the new line of totally-enclosed, fan-cooled motors added to General Electric's family of Form G fractional horsepower motors is this poly-phase 60/50-cycle model.

★ ★



EASTERN GAS and FUEL ASSOCIATES

A new, improved, cleaner BEACON COAL will be on the market early in 1962 upon completion of Eastern's huge new processing plant at Federal Mine No. 1.

This new facility will be the most modern, highly automated plant in the Fairmont, West Virginia, coal field. It is designed to produce 12,500 tons-per-day of completely cleaned and dried coal in a wide range of sizes.

Symbolic of Eastern's faith in the future of coal, the new plant will meet the continually expanding demand for quality coals for public utility, industrial and domestic use.



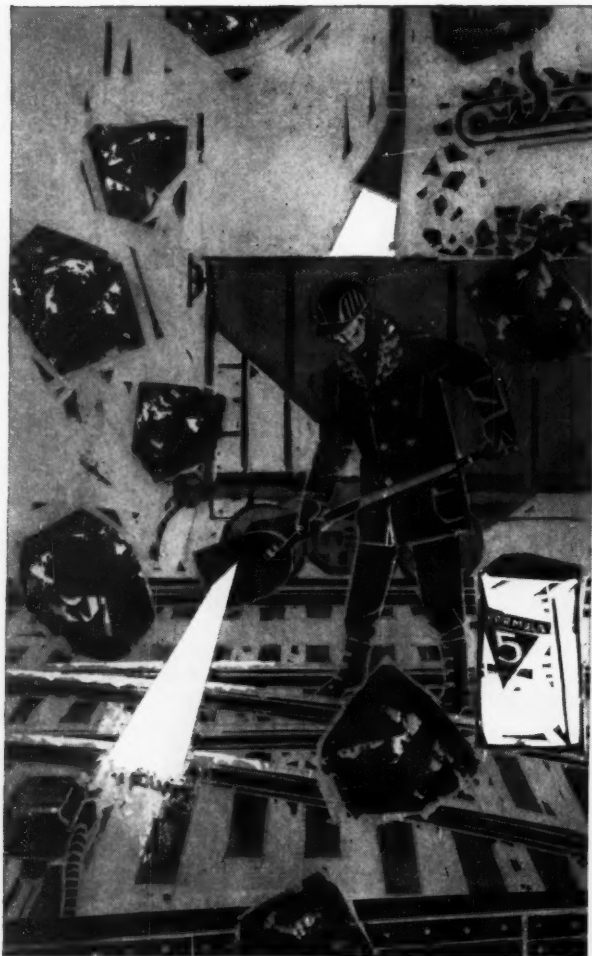
ENGINEERS & CONTRACTORS

ROBERTS & SCHAEFER

DIVISION OF THOMPSON-STARRETT COMPANY, INC.

201 NORTH WELLS STREET, CHICAGO 6, ILLINOIS

NEW YORK 19, N. Y. • PITTSBURGH 22, PA. • HUNTINGTON 10, W. VA. • ST. PAUL 1, MINN.



KEEP COAL FREE-RUNNING

...TRACKS, SWITCHES AND WALKS ICE-FREE...WITH MORTON "FORMULA 5" CONTAINING RUST INHIBITOR

"Formula 5," unlike plain rock salt or simple salt/chemical mixtures, has a combination of rust inhibitors added to prevent corrosion of cars, motors, conveyors and other equipment. It is treated to control its dissolving rate and to prevent its caking during shipping and storage. It won't cause costly delays by lumping or caking in feeders.

"Formula 5," with a new, easily distinguishable blue color, is specially made to meet the requirements of coal producers. A free-flowing product, it is composed of chemically treated sodium chloride (30-70 mesh) and a special new improved combination of anti-corrosive compounds.

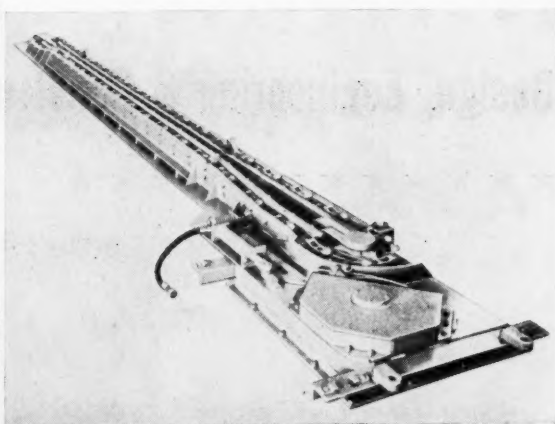
Morton "Formula 5" is the safest, most effective freezeproofing compound you can buy. Even at sub-zero weather it keeps coal free-running, and serves as an ideal de-icer wherever freezing presents a problem.



Write for free booklet, "The Key to Low Cost Effective Freezeproofing." If you would also like a Morton representative to assist you with freezeproofing and equipment maintenance problems without cost or obligation, write:

MORTON SALT COMPANY

Industrial Division, Dept. CA8, 110 N. Wacker Drive, Chicago 6, Ill.



Trip Holder Prevents Drift of Mine Cars

To eliminate difficulties common in the uncontrolled movement of mine cars during automatic loading, Nolan Co., Bowerston, Ohio, offers its trip holder.

Called "Hold-A-Trip," this medium-duty device is suitable for preventing drift of mine cars on level grades or down grades requiring under 10,000 lb holding effort.



Screen With Discharge Spout

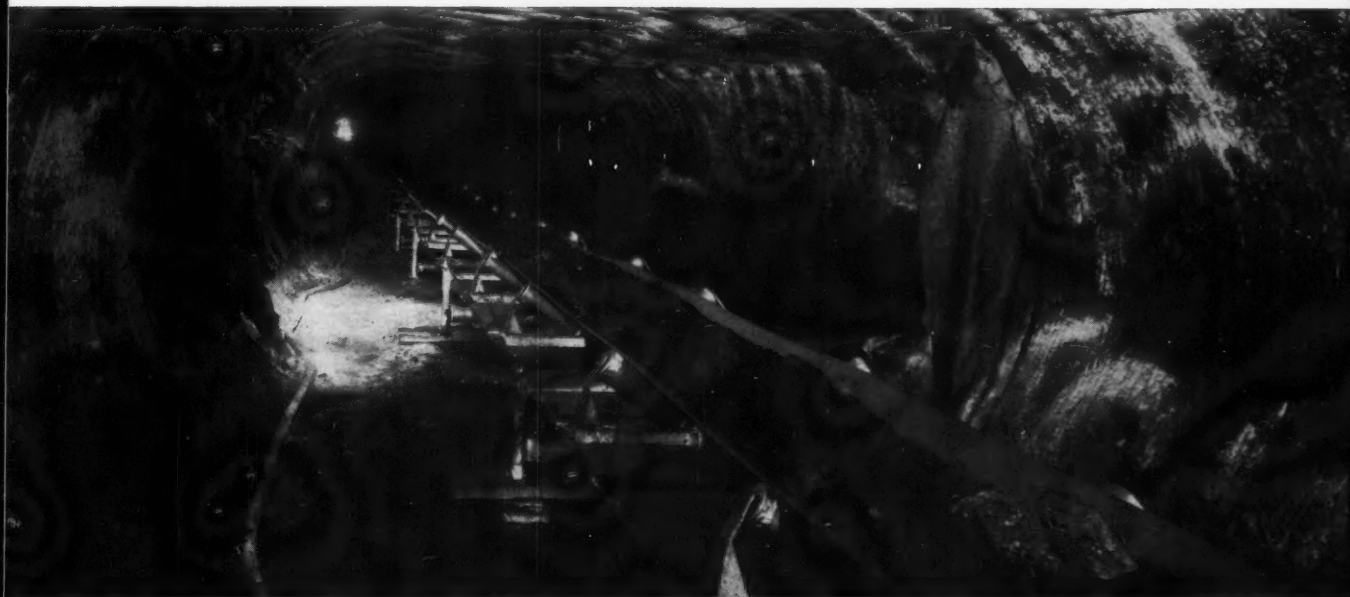
This single-deck "Ripl-Flo" scalping screen incorporates a curved discharge end section to feed oversize directly into a crusher or breaker.

Because of its curved perforated plate discharge end section which serves as a spout, this screen is a space saver as well. It measures 8x14 ft, is floor-mounted and rubber-air-spring supported. With 6-in openings and a No. 6 mechanism, it operates at 3/8-in amplitude at a speed of 900 rpm with a 22 1/2-deg slope.

Made by Allis-Chalmers Mfg. Co., Milwaukee 1, Wis., the screen shown here is now processing 1,300 tph of 8-in r-o-m coal at facilities of the Truax-Traer Coal Co., Chicago.

A large, dark, stylized gear shape is centered at the top of the page. Inside the gear, the text "Why you can slash haulage costs with LO-ROPE belt conveyors" is written in white. The gear is flanked by two white diagonal lines that extend downwards and outwards, resembling conveyor belt supports.

Why you can slash
haulage costs
with
LO-ROPE
belt conveyors



Long-Airdox's development of the "Lo-Rope" principle to perfect modern wire rope side frame design offers many important benefits. Savings in time and labor for installation and maintenance plus greater load-carrying capacity reduce haulage costs to a minimum.

In this design, precision roller bearings are combined with a highly effective labyrinth seal to provide an idler roll that's unequalled in performance. Low idler drag holds pull requirements to a minimum. The floating nylon labyrinth seal offers the advantages of a modern sealed bearing while retaining free-turning and re-greasing ability.

Here are a few more reasons why you can move more coal more profitably with a Long-Airdox "Lo-Rope" belt conveyor.

Reduced labor costs—conveyor stays aligned—platform rocker support stands can't walk out of position.

Increased belt capacity—fixed deep troughing angle (20°, 27°, or 35°) gives greater payload without spillage.

Belt stays centered—design provides automatic self training.

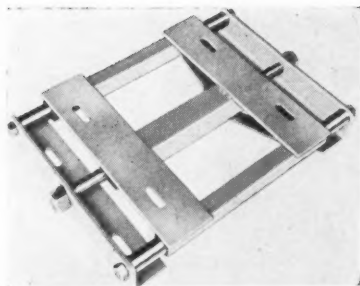
Automatic leveling of belt—made possible by adjustable support stands. Blocking for uneven bottom is eliminated.

Conveyor moves simplified—the "Lo-Rope" has fewer components.

Belting lasts longer—no possible contact with idler or stand connections to wire rope.

For complete information, write the Long-Airdox Company, Division of Marmon-Herrington Company, Inc., Oak Hill, West Virginia.

LONG-AIRDOX



Motor Bases Provide Proper Belt Tension Automatically

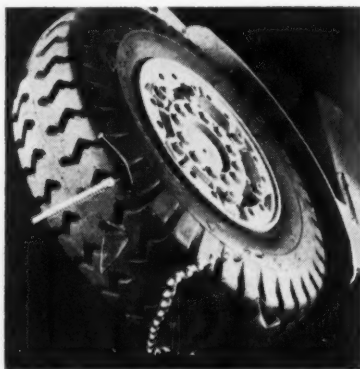
Three new series of all-welded, tension-controlling motor bases with freely-movable carriages have been introduced by Manheim Mfg. & Belting Co., Manheim, Pa.

These Manheim "Automatic" motor bases are said to eliminate excessive wear on belts and bearings by always providing, automatically, the proper amount of belt tension even under heavy starting loads. The manufacturer points out that the proper amount of tension to apply to a belt drive is the minimum necessary to transmit the required power without slippage. Re-adjustment, when necessary, is made while operating under load merely by turning a screw.



Pulley Has Spun End

There are no end-plate weldments on the new one-piece steel "Curve Crown" pulley featuring exclusive spun-end construction. Thus, principal sources of metal fatigue stress and other troubles have been eliminated. Available in diameters up to 24 in, these pulleys have been developed by Stephens-Adamson Mfg. Co., Aurora, Ill.

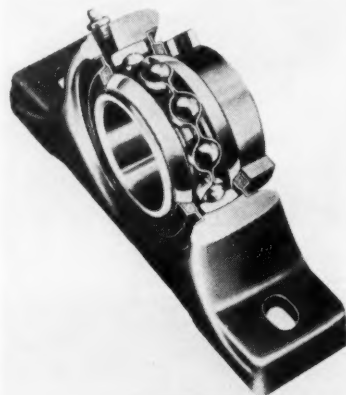


Tough Pneumatic Tire

With something borrowed and something new in its design, the Cross Rib

Industrial pneumatic tire has been developed for service where extreme durability and cut resistance are essential.

Specially-compounded tough rubber construction plus a tough body of tempered cord make this tire extremely resistant to gouging and abrasion as well as long wearing. Goodyear reports that the tread is up to 60% thicker than those of ordinary industrial pneumatics and is ideally fitted for mine service and on forklifts. For further information write Howard Babcock, manager, News Bureau, Goodyear Tire & Rubber Co., Akron 16, Ohio.



Ball Bearing Pillow Blocks

Link Belt Co. offers its new line of Series P2-300 self-aligning ball-bearing pillow blocks in 31 shaft diameters.

The new series of heavy-duty bearing blocks are equipped with self-aligning, single-row, deep-groove precision ball bearings. Interchangeable with other makes, they are available in a complete range of shaft sizes from $\frac{1}{2}$ to 4 in, and conform to basic standards of the AFBMA. Literature can be obtained by writing to the company's Dept. PR, Prudential Plaza, Chicago 1, Ill.



ACCESSORY BLASTER — Geophysical Specialties Co., Hopkins, Minn., has

Car Vibrator Combines Light Weight, Heavy Impact

A lightweight air-powered vibrator for emptying railroad hopper cars has been announced by Cleveland Vibrator Co. Even though the new vibrator weighs less than 70 lb, it can create a vibratory force of over 1,000 lb, according to Cleveland.

The 3-in "KO-LSRR" features a one-piece vibrator attached to a cast-steel male wedge head. Designed to fit a standard railroad hopper car bracket, this vibrator can be lifted from its bracket mounting and moved without loosening



We've taken off our shine, too

**Every National oil seal is now
phosphate coated to inhibit rust**

Other oil seals are still shiny. But look what National gives you in place of the gleam: an exclusive phosphate coating that improves rust resistance by "holding" rust-preventing lubricants to the seal's metal surfaces. The result is superior rust resistance on the shelf . . . and on the shaft where condensation is a constant peril to seal life.

This phosphate coating has another important advantage.

It provides better adhesive properties and makes possible a more positive bond between metal retaining parts and Syntech rubber sealing members. This gives you a better seal with longer life.

Phosphate coating is just one of the "extras" in National seals. And with National you choose from a complete line with both Syntech rubber and Micro-Torc® leather seals in practically every type and size. When you need seals . . . get the best. Call your National Seal Distributor.

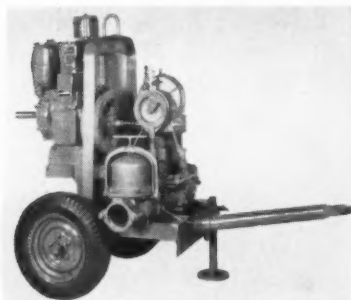


NATIONAL OIL SEALS

FEDERAL-MOGUL SERVICE

DIVISION OF FEDERAL-MOGUL-BOWER BEARINGS, INC. • DETROIT 13, MICHIGAN

introduced a compact blaster for use with the MD-1 Engineering Seismograph. A few feet of Primacord, wrapped around a blasting cap and placed a measured distance from the MD-1 geophone, can be detonated automatically by the blaster to give seismic readings to a depth of 200 ft and more, depending on subsurface composition.



CENTRIFUGAL PUMPS—Many new design features for improved operation and longer life are claimed for a new complete line of heavy-duty self-priming centrifugal and diaphragm pumps. Because of these new features, the company reports that the equipment is offered at a very competitive price. Powered by Lister air-cooled diesel engines, these pumps are available from Rice Pump & Machine Co., Belgium, Wis.

Equipment Shorts

Pneumatic Vibrator—A vibrator that can give changes of impact and frequency independently of each other or together has been placed on the market by Branford Co., 132 Glen St., New Britain, Conn. In addition to self-control, the outstanding feature of the "Vibra-just" Variable Impact Vibrator Model 3 is its ultra high impact amplitude. Because it has exceeded 20,000 g's in acceleration tests, the kinetic energy of the V.I.V. is up to 10 times that of a conventional vibrator, yet it consumes only $\frac{1}{6}$ to $\frac{1}{50}$ the amount of air.

Electrode Holders—Especially designed for high amperage on large electrodes or on iron-powder-coated electrodes, two electrode holders are offered by Tweco Products, Inc., P. O. Box 666, Wichita 1, Kan. No. A-14-HD is available for 400 amp work and A-38-HD for 500 amp work.

Rubber-Like Compound—A new family of rubber materials which do not require heat or pressure has been developed by Devcon Corp., Danvers, Mass. Called "Devcon R," these self-curing rubbers can be used to line coal chutes, tanks, pumps, etc. Consisting of two liquids

simply mixed together which cure at room temperature, they form an extremely tough and highly resilient product. In addition, they are non-shrinking and thick sections can be poured or cast at one time. Putty-like or liquid types are offered.

Track Link Improvements—Basic improvements in design and manufacture that result in stronger, more durable track links with lower maintenance costs have been announced by Caterpillar Tractor Co., Peoria, Ill., for six Cat-built units. On the D7 tractor, 977 loader and 572 pipelayer, cross-sectional area of the rail has been increased 12%. Links for the D6 tractor, 955 loader and 561 and Md-6 pipelayers are now Hi-Electro hardened.

Welding Plate—Use of a new high-quality gold-coated welding plate gives increased visibility of the welding operation, resulting in better welds. Called "Weld-Cool," this premium-type protective glass filter is particularly adapted to gas-shielded welding-arc processes where excessive infrared radiation is present. Safety Products Div., American Optical Co., Southbridge, Mass.

Differential—More efficient use of engine power is said to result from a new differential designed and produced by Dual Drive, Inc., 3597 Lee Rd., Cleveland 20, Ohio. Consisting of a balancing gear and a side gear, the entire unit is quickly interchangeable with a standard gear carrier. In operation, worms on axle shaft mesh with worm wheels to assure positive drive under all conditions.

Pick-Up Pumps—A new line of light, pick-up pumps is designed to include openings $\frac{3}{4}$ and 1 in on both suction and discharge. Pumps of $\frac{3}{4}$ -in opening handle to 1,500 gph and capacities on the 1-in range to 2,400 gph. Rice Pump & Machine Co., Belgium, Wis.

Safety Glasses—Major change in the redesigned Flexi-Fit line of safety glasses is use of a seven-barrel hinge which is 40% stronger than the former five-barrel hinge. This hinge incorporates a new Duragrip temple-screw assembly which keeps temples tight permanently. Safety Products Div., American Optical Co., Southbridge, Mass.

Transmission—"Twin Disc" Series TD-44-400 power-shift transmission provides four forward and four reverse speeds with full power shifting in all ranges. Two models are offered with an overall ratio coverage of 6.91:1. Transmission Application Engrg. Dept., Twin Disc Clutch Co., Racine, Wis.

Electrodes—Stulz-Sickles Co., 929 Julia St., Elizabeth, N. J., is producing a new

line of welding electrodes. First four types in the line are: Manganese-XL (low hydrogen), an AC-DC austenitic 14% manganese-nickel electrode; Universal Hardface, an all-purpose AC-DC electrode; Spray-Rod, an AC-DC "spray-on" type rod for thin-layer hardfacing; and Piercing Electrodes which will cut, gouge, channel and pierce any metal.

Cutting Tips—Providing a wider range of flame adjustments for faster, cleaner cutting of thin plate steel, a new line of low-pressure natural-gas cutting tips are offered. Identified as Series 6290 NX, these tips are used with Harris injector-type cutting torches and cutting attachments. Harris Calorific Co., 5501 Cass Ave., Cleveland 2, Ohio.

Free Bulletins

Couplings—An expanded line of Dodge Para-flex flexible cushion couplings that absorb vibration and compensate for all combinations of shaft misalignment and end float is described in Bulletin 901B. Write Dodge Mfg. Corp., Mishawaka, Ind.

Chain Drive Selection—Availability of Bulletin 611P featuring easy-to-follow chain drive selection procedures for its Rex stock industrial chain lines has been announced by Chain Belt Co., Sales Promotion Dept., Milwaukee 1, Wis.

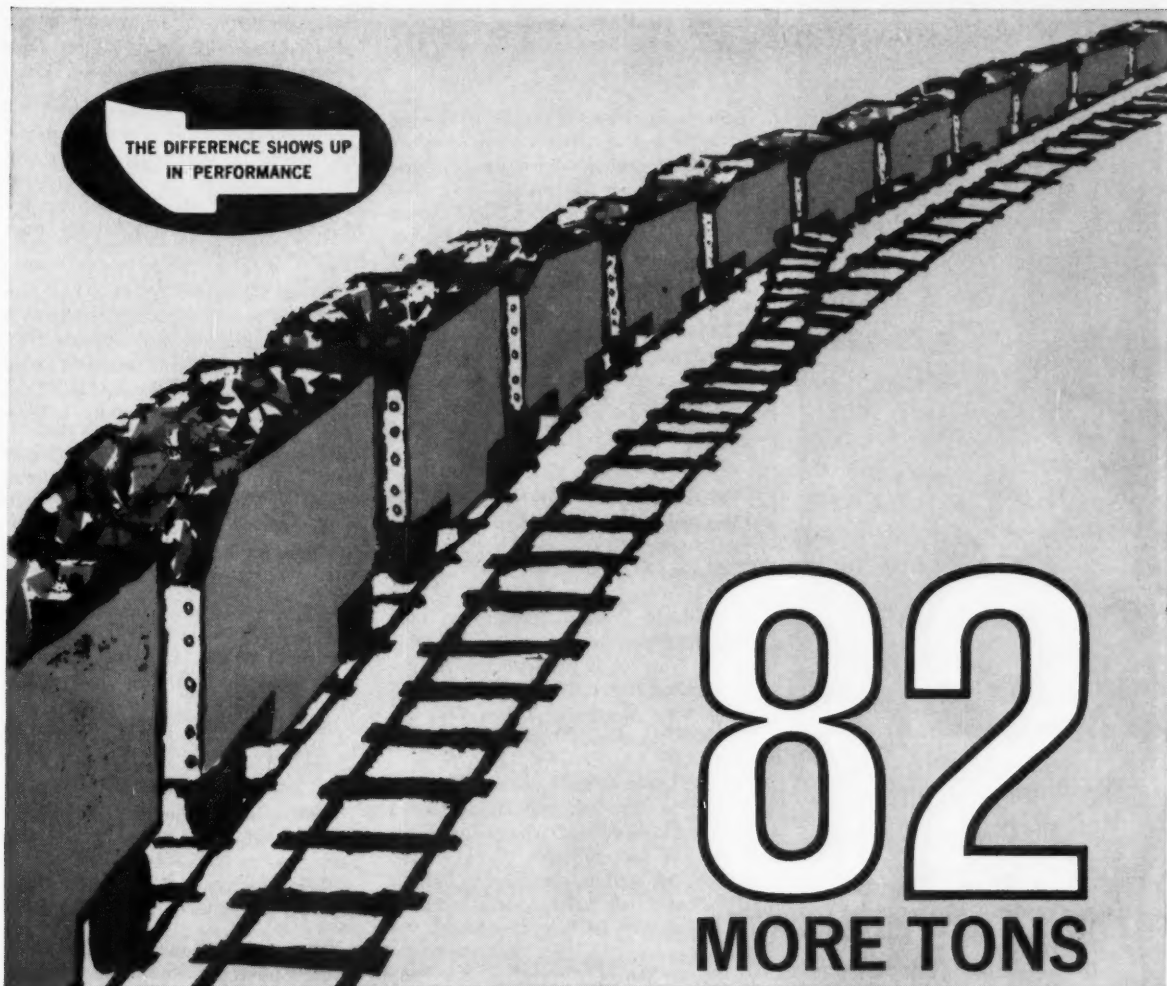
Self-Sealing Couplings—A 20-p booklet devoted to a general discussion of the basic applications possible with Self-Sealing Couplings, Bulletin 629 was prepared chiefly to acquaint the engineer or technician with general information rather than specific details. Advertising Dept., Aeroquip Corp., Jackson, Mich.

Reducers and Belting—Hewitt-Robins, Stamford, Conn., offers literature on reducers and belting. Bulletin J-25 contains the latest data on Jones horizontal and vertical spiral-bevel speed reducers; address Dept. SR. For your wall chart pointing out various ways to cut down on wear and tear of conveyor belting through proper maintenance procedures, write Dept. WC.

Drilling Rigs—Form 4215 is designed to show how contractors and miners can create special drilling rigs to meet their own particular problems using Ingersoll-Rand drilling components. For your copy, write the company at 11 Broadway, New York 4, N. Y.

Multiple-Shooting System—A mobile multiple-shooting system to improve drilling and shooting cycles in conventional coal mines is featured in a booklet

THE DIFFERENCE SHOWS UP
IN PERFORMANCE



82

MORE TONS

...loaded per machine shift by using KENNAMETAL* bits

This profit producing performance was obtained by an operator who used Kennametal bits in comparative tests with other bits. It again proves that Kennametal bits can help operators get maximum efficiency from costly machines... more tons per shift.

Here's why. Kennametal cutter bits are designed to cut coal—not rub it. The carbide inserts are harder, hold a cutting edge longer. They cut faster, require less regrinding. The results are fewer bit changes, less downtime—and increased production.

A look at your production costs may indicate that a few cents invested in bit cost may pay off in dollars for you—by keeping your machines producing more minutes, and thereby more tonnage per machine shift.

For a check on how the superior performance of

*Trademark

Kennametal bits may help you improve production and profits at your mine, call your Kennametal Representative or contact us direct. KENNAMETAL INC., Mining Tool Division, Bedford, Pa. Phone 623-5134.

**Pennies invested in bit cost per ton
gain dollars in added tonnage per shift**

Over-All Bit Cost per Ton

with Kennametal Bits.....3.5¢
with Competitive Bits.....3.1

0.4¢

Kennametal Bits: 0.4¢ higher.

Tons Mined per Machine Shift

with Kennametal Bits...331 Tons
with Competitive Bits...249

82 Tons

Kennametal produced 82 tons more per shift.



INDUSTRY AND
KENNAMETAL
...Partners in Progress



**No Starved Pumps...
No Blocked Systems
SCHROEDER
HYDRAULIC LINE FILTERS
Cut Maintenance...
Reduce Downtime**

Here's the full-flow line filter that has earned acceptance because of its superior performance! The Schroeder Line Filter does a better cleaning job without starving the pump or blocking the circuit. Installed on the pressure or return line, it provides finer filtering with no danger from dirt clogging which can occur with a filter or strainer mounted in the system's suction line.

Schroeder Line Filters are easily installed and accommodate pressures up to 2500 psi. Replaceable filter elements are available with initial particle selection ratings from 3 to 40 microns. Dirt particles .00019 in size are removed from hydraulic lines.



HAPPY HY SEZ:

"Schroeder Filters Are
Cheaper Than Dirt!"

**SCHROEDER BROTHERS
CORPORATION**

McKees Rocks (Pittsburgh District) Pennsylvania

entitled "9 Ways To Cut Production Costs," issued by Long-Airdox Co., Box 331, Oak Hill, W. Va.

Steels—Four papers on the continuing advances in the strength levels, product forms and design applications of constructional steels are printed in a 59-p brochure, "New Concepts in Steel Design and Engineering." Write to the Market Development Div., U. S. Steel Corp., 525 William Penn Pl., Pittsburgh 30, Pa.

Lubrication—Catalog 82, illustrating and describing its line of centralized lubrication equipment, is offered by Lincoln Engineering Co., Industrial Sales Div., 4010 Goodfellow Blvd., St. Louis 20, Mo.

Wrenches, Hand Tools—Snap-on Tools Corp. has published a 128-p wrench and tool catalog. Company address is 8132 28th Ave., Kenosha, Wis.

Eyeshield—Practical, convenient, non-fogging eye protection, easily adaptable to all types of head protection, is described and illustrated in Bulletin 0302-5 from Mine Safety Appliances Co., 201 N. Braddock Ave., Pittsburgh 8, Pa.

Core Driller—The new "142-C" is the answer to deep-hole and large-diameter diamond core drilling, reports Sprague & Henwood, Inc., Scranton 2, Pa. Capacities of this machine described in Bulletin 170 range from 2,250 ft for EX drilling to 500 ft with 6x7 3/4-in core barrel.

Tractor Shovel—A specification bulletin featuring the new Model 114 Trojan tractor shovel is available from any

Trojan distributor or by writing to the Yale & Towne Mfg. Co., Trojan Div., Batavia, N. Y.

Wheel-Scraper—"Climb Aboard the New 619C" is the title of a new publication offered by Caterpillar Tractor Co., Peoria, Ill. One of the newer machines in the Caterpillar wheel-scraper line, the 619C is described on a typical work operation.

Torque Converter—A 24-p book entitled "Why a Torque Converter is Standard Equipment in the Eimco Tractor Unique Power Train" has been issued by Eimco Corp., P. O. Box 300, Salt Lake City 10, Utah. Request Bulletin L-1078.

Hose and Tube Fittings—For your copies of two comprehensive, tab-indexed catalogs on hose fittings & hose assemblies and tube fittings, write to Parker-Hannifin Corp., 17325 Euclid Ave., Cleveland 12, Ohio.

Parts Rebuilding—A colorful, 16-p, "how to" booklet published by American Manganese Steel Div. of American Brake Shoe Co., offers instructions and welding tips useful in the repair and rebuilding of worn parts. Write Dept. A, 389 E. 14th St., Chicago Heights, Ill.

Drilling Rigs—Bulletins describing the new line of Le Roi blasthole drilling rigs from 2 1/2- to 7 3/4-in hole size will be mailed on request to Le Roi Div., Westinghouse Air Brake Co., Sidney, Ohio.

Drives and Couplings—Dodge Mfg. Corp., Mishawaka, Ind., offers Bulletin 70 giving detailed data on the company's Flexidyne drives and couplings.

Among the Manufacturers



W. E. Goodman



H. Goodman

William E. Goodman, Goodman Mfg. Co.'s chairman of the board, has retired. Succeeding him is Howard Goodman who continues as president and chief executive officer, a post he has held since 1958. Also, John S. Newton has been named executive vice president. In addition to responsibilities for mine machinery engineering and development, Mr. Newton will coordinate the com-

pany's engineering and manufacturing activities as well.

W. E. Goodman's initial contact with the mining industry dates back to 1920 when he accepted a job in the engineering department of the Goodman company founded by his father in 1900. Progressing through the ranks he became president in 1939 and chairman of the board, as well, in 1955. Now, though retired, he will continue to be a member of the board of directors and act as consultant in company affairs.

Other Goodman appointments include L. W. Peterson who has moved to Pittsburgh as sales manager of the company's newly-created U. S. eastern division. Formerly he managed the firm's Huntington, W. Va., sales district and has been succeeded in these duties by Sheldon Jones, former assistant district

manager. In addition, L. S. Ahlen has been made sales manager of the new western division and will remain in Chicago where he had been serving as assistant sales manager.

Newly-appointed product sales manager of U. S. Rubber's conveyor belting products is T. B. Applewhite. Starting as a sales trainee in 1947, he has served in various sales capacities in the Memphis, St. Louis and Pittsburgh branches before his transfer to the mechanical goods division's sales office in Passaic, N. J., where he will continue to headquarter.

Darrell E. Albert replaces C. R. Dever as manager, Chicago District Sales Office, Mine Safety Appliances Co. A Mine Safety employee since 1950, Mr. Albert has held various sales engineering posts before his last appointment as product line manager of gas masks and respirators in 1957. Mr. Dever has transferred to Pittsburgh as manager of sales promotion.

George Hill Cady has been promoted to sales manager, Mining Equipment Div., Columbus McKinnon Corp., Tonawanda, N. Y. For the past 2 yr he served as customer service manager.

The Electrical Products Div. of Joy Mfg. Co., St. Louis, has named W. Charles Brandenburg manager of mining sales. Mr. Brandenburg joined the firm in 1957 as a sales engineer and has had extensive experience in the electrical field.

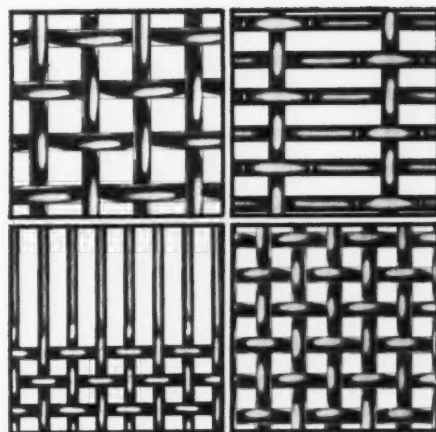
Frank J. Durzo succeeds C. J. Leifeld as executive vice president, Jeffrey Mfg. Co. Mr. Leifeld retired May 31 after a career of 45 yr with Jeffrey. Mr. Durzo joined the firm in 1947 as an industrial engineer supervisor, progressing to assistant superintendent in 1949, general superintendent in 1953 and works manager in 1954. In 1957 he was elected to the board of directors and became vice president in charge of manufacturing in 1958.

W. W. Gould has advanced to nickel-iron battery market manager of Exide's Industrial Marketing Div., The Electric Storage Battery Co. An 18-yr veteran of the battery business, he was formerly Chicago district manager of the company's Nickel-Alkaline unit.

Company Briefs

As an interim measure pending rebuilding of the Joy Chain Plant in Franklin, Pa., Joy Mfg. Co. has announced plans to transfer manufacturing

there
is
no
substitute



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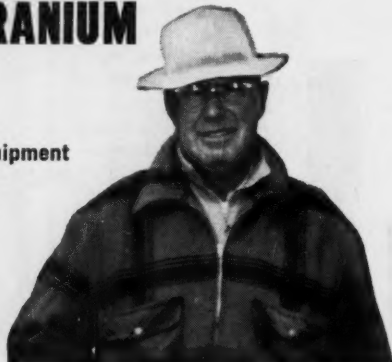
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FROM CONSTRUCTION WORK TO URANIUM MINING

"Bonded Buy used Cat equipment
has always given me
first-rate service,"
says **GARN MOODY**



Garn Moody has capitalized on his working knowledge of heavy equipment to branch out into a number of successful business operations. From his initial start in contracting, he has put his reliable spread of used Cat-built equipment to work in the non-allied fields of farming and, since late 1958, a thriving strip-mining operation in the rugged country near Delta, Utah.

"When you're moving into an unfamiliar new field, you've got to have smart crews and dependable equipment," says Garn Moody. "My used Cat-built rigs have always given me good steady production. We've worked our two D8s and two DW20s 8 to 10 hours a day since we bought them two years ago. The work is rough, but down time has been light."

Garn has purchased all three types of used equipment his Caterpillar Dealer offers: Bonded Buy, Certified Buy and Buy and Try. "In each case," he says, "the deal worked out fine for me. I'll buy under the same contracts any time. Dependability from Bonded Buy machines is like buying a new machine."

Success is never a sure thing, but if you're expanding your operations and trying to keep your equipment outlay on a budget basis—without sacrificing reliability—check your Caterpillar Dealer's protected purchase plans.

Caterpillar Tractor Co., General Offices, Peoria, Ill., U.S.A.

CATERPILLAR

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**BEST BUYS IN NEW
AND USED EQUIPMENT**

of its chain products to other Joy facilities. The Chain Plant, one of three Joy plants located there, was destroyed by fire June 2. With the transfer of production and salvage of some product inventory, the company plans to be able to take care of customer requirements for these products and plans definitely to continue in the chain business.

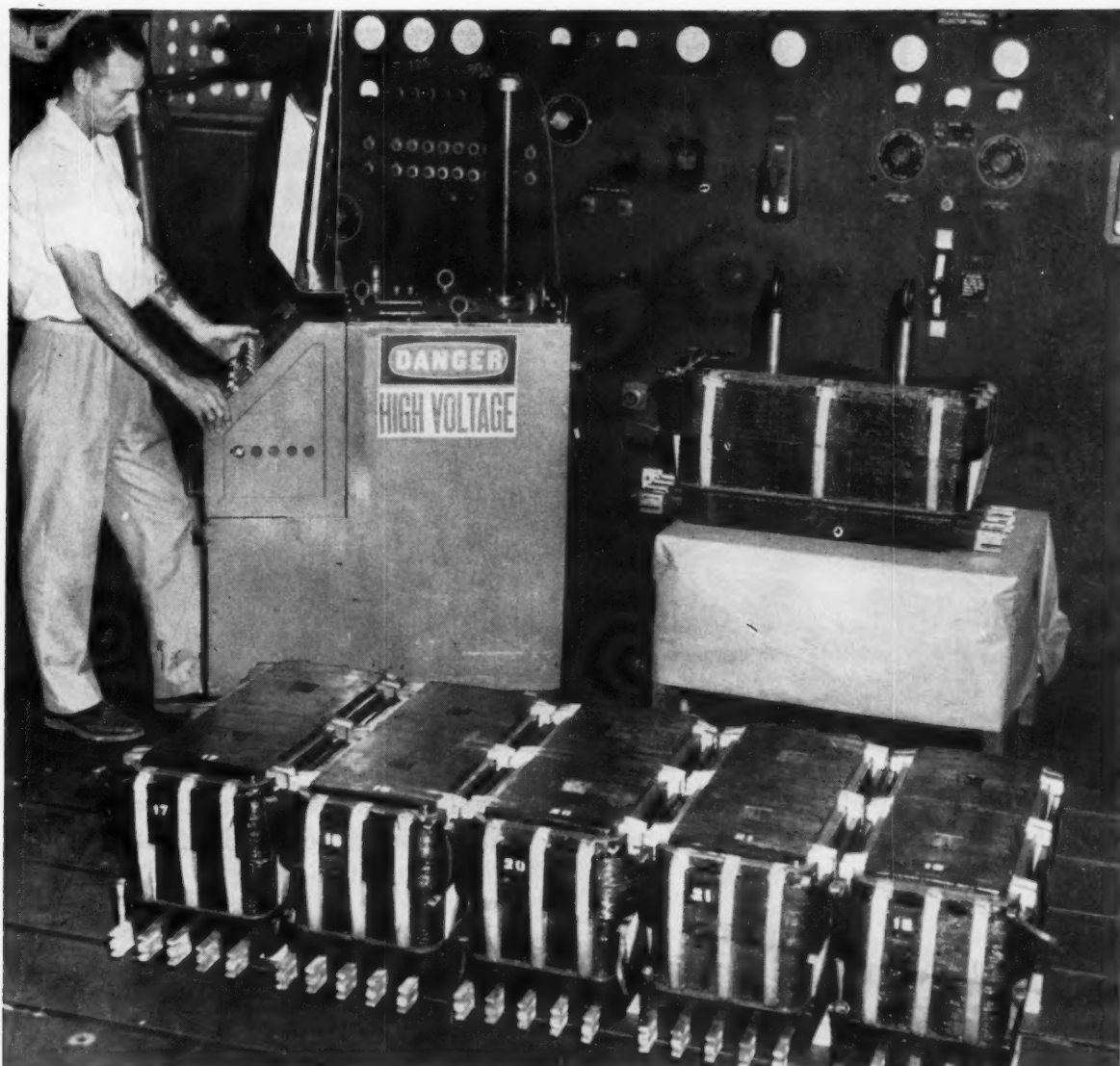
Brinker Supply Co., Inc., 6545 Hamilton Ave., East Liberty, Pittsburgh, Pa., has been appointed Allis-Chalmers engine dealer for 26 counties in Pennsylvania and four in West Virginia. The new dealer will sell and service Allis-Chalmers engine and power units and engine driven electric generating sets.

The world's largest conveyor-belt tester has been placed in operation by U. S. Rubber Co. at its Passaic, N. J., plant, the company announced. Electronically-controlled, it can test belts up to 140 ft long at speeds of 2,000 fpm.

Joy Mfg. Co. plans to expand some of its larger facilities, relocate several activities and close two small plants at an expenditure of over \$3 million. The Coal Machinery Div.'s engineering center at Franklin, Pa., will be expanded by about 20,000 sq ft of office-building space. This additional space will accommodate manufacturing and engineering activities of Compton, Inc., a Joy subsidiary, now located in Clarksburg, W. Va., and the Coal Machinery Div.'s conveyor department now in New Philadelphia, Ohio. The space made available in New Philadelphia, in turn, will be used by the Electrical Products Div. presently in St. Louis. And production at Claremont, N.H. will be expanded by the addition of gear and chain manufacturing. As a first step in this overall plan, the company's Baash-Ross Div. has concentrated six relatively scattered oil tool manufacturing operations into two major locations.

Allegheny Ludlum Steel Corp. has named two new Carmet mining tool distributors. Central Supply Co., with headquarters at Andover, Va., will service the coal mining areas of Virginia while the Bit Grinding Service, Carlsbad, N.M., will cover the coal fields in New Mexico and southern Colorado.

McNally Pittsburg Mfg. Corp., Pittsburg, Kan., and Bird & Co. (Pvt.) Ltd., Calcutta, India, have formed an Indian corporation to manufacture heavy equipment for India's basic industries. The new company, to be known as McNally-Bird Engineering Co. (Pvt.) Ltd. located at Kumardhubi, Bihar, will operate as contractors for complete coal preparation and other plants based on American design.



NATIONAL COIL'S TESTING KNOW-HOW HELPS ECONOMIZE ON FIELD COIL RECONDITIONING

These field coils for a 3500-hp D.C. steel mill motor were reconditioned by National on a rush basis—10 days from pick-up to delivery. The work included cleaning and testing, dipping and baking, and replacement and reinsulation where required.

Despite the rush nature of the job, National applied its usual thorough testing. Considerable savings resulted to the customer. The customer had made a-c tests in his mill indicating pole face windings were OK but National also made d-c polarization index tests showing insula-

tion was not satisfactory. After thorough drying, varnishing and baking, further tests assured insulation was fully restored without replacement.

In this application, National's know-how prevented future trouble—but avoided the expensive way of correcting it. The same know-how can assure you of maximum dependability on your coil or rebuilding jobs. For information contact National's Columbus plant... HUDSON 8-1151... or check the nearest National field engineer.



National Electric Coil

COLUMBUS 16, OHIO • IN CANADA: ST. JOHNS, QUEBEC

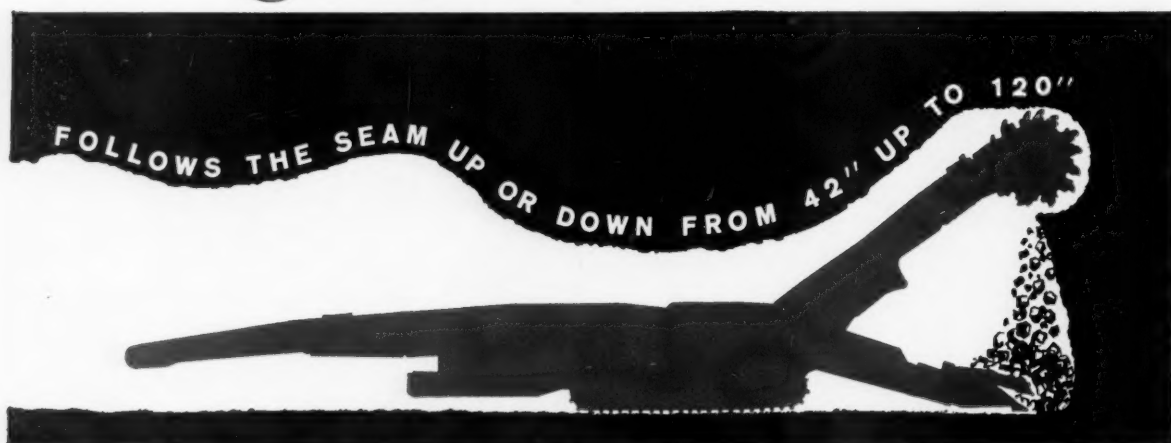


INSTANTLY CONTROLLABLE CUTTING HEIGHTS

Lee-Norse CM38

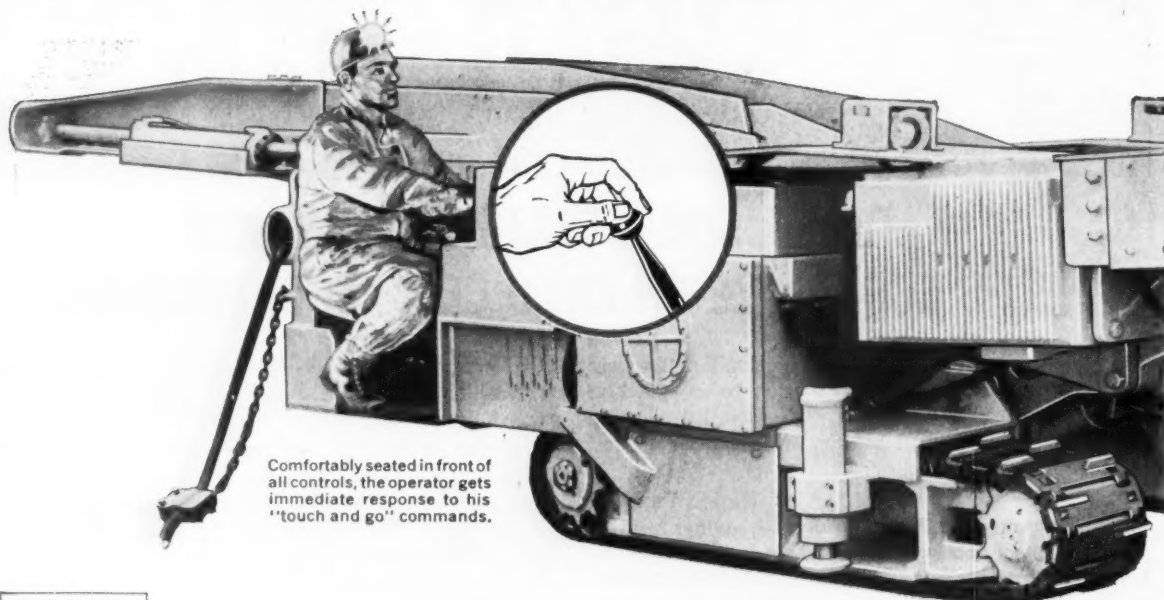


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Here's the modern Miner with "touch and go" vertical action. Hydraulically controlled to follow uneven seam conditions.

This feature mines high and low coal seams from 42 inches to 120 inches for hundred percent extraction.



Comfortably seated in front of all controls, the operator gets immediate response to his "touch and go" commands.



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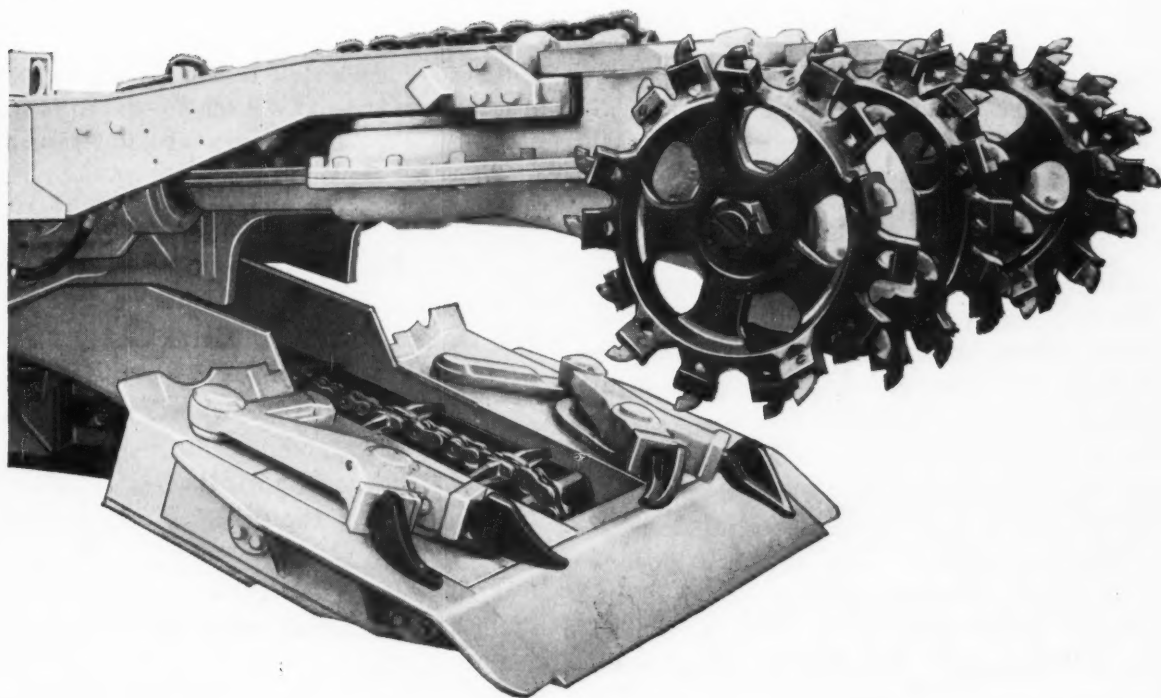
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The powerful, spinning, oscillating cutters respond instantly to the operator's command to follow and cut the seam's varying heights.

The Miner quickly mills out space for a loading station . . . provides greater working area—all by "touch and go" control.





62 TONS OF COAL ON THE MOVE!

New Cat 630 hauls heaped loads up 7% grade at 6.3 MPH

Climbing out of the pit for 1/10 mile up a 7% grade, this 630 averaged 6.3 MPH, accelerating all the way—with a gross vehicle weight of 207,300 pounds. That's big-profit production and grade-ability!

Here's another example of the 630's grade-ability: on one run the machine was stopped 200 feet from the top. With a capacity load, it started again without spinning or bucking, smoothly accelerated and shifted into direct drive in about 15 feet. At the top it was ready to shift into 2nd range for a fast trip to the hopper.

The performance studies reported here were made on three Cat 630 wheel Tractors with matched PH630 Coal Haulers (built by Athey Products Corporation) owned by Truax-Traer Coal Co., Fiatt, Illinois. Total haul distance was 4.17 miles, weather was excellent and the haul road was hard and well-maintained.

If you've had a close look at the 420 HP 630 in action, you know what it can do—and why. But if you haven't, here are some facts that partially

NEW CAT 630-PH630 COAL HAULER

**420 HP
(335 HP flywheel)**

**41.5 MPH
top speed**

**60 TON
struck capacity**



LOOK AT THIS PRODUCTION

Performance comparison with a DW20 on a 4.17 mile haul road (including wait time)

	630	DW20
Average cycle time	29.8 min.	28.5 min.
Trips per 60 minute hour	2.0	2.1
Average payload	62.5 tons	46 tons
Production per hour	125.6 tons	97.1 tons

explain its ability to deliver high production and high availability at low cost.

Fact one: Cat power shift transmission—a new concept that automatically adjusts the machine to grade and road conditions. There are nine different speed variations but the operator need only concern himself with three speed ranges. Controlled by one lever, each range has three *automatic* shifts—torque divider drive, direct drive and overdrive. A dial indicator tells him when to change his speed range for the best travel speed. Result: split-second shifting, steady acceleration on grades and faster cycles.

Fact two: low center of gravity and balanced construction—give operators the secure feeling of stability so they push these units to the limit all the time. Even with capacity loads—60 plus tons of payload—the 630s handle well at speeds up to 41 MPH... and operators comment on the good ride and easy handling.

Fact three: full unit construction—easy serviceability. Range transmission can be removed as a unit with cable control and differential carrier; torque divider transmission is removable as a unit without disturbing the engine. Radiator, side plates and fan can be removed as a unit for servicing or to provide easy access to front of engine. Also, fenders tip forward for easy tire removal.

For *all* the facts on the 630's productivity, availability, operating ease and low-cost performance, see your Caterpillar Dealer.

Caterpillar Tractor Co., General Offices, Peoria, Ill., U.S.A.

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**PRODUCE MORE AT
LOWER COST WITH A 630**



This is
AMERICAN OIL COMPANY
in action



BY C. L. "CHARLIE" BROWN

About the Author. Charlie Brown is a lubrication specialist. His eleven years of experience in such work are only part of his qualifications. He majored in math and physics at Eastern Illinois State College and he has completed the Company's Sales Engineering School.



On the coal washing equipment at Crown Mine they were experiencing trouble with the lubrication of the air valves. Because the grease wasn't getting in to do the lubrication job, valves were sticking. Working with the General Top Foreman, we recommended RYKON Grease "R." This is a grease with unique properties. It flows like an oil, but the shearing action exerted by working pressures irreversibly converts the fluid to a grease. Since switching to RYKON Grease "R" in the washing jigs there's been no grease leakage and the valves work freely.

This is one instance where we helped solve a problem. But our big job was surveying the lubrication needs of the preparation plant at the time it was built. This was done and lubrication recommendations were made to insure the most economical operation of the plant. We solved the mine's problems on inventories, too. With warehouse facilities only 12 miles from the plant, we're able to keep supplies of needed products available for immediate delivery. This cuts inventory costs and provides insurance against having to wait for deliveries.



Is this the kind of product performance and service you're looking for? Get it by calling the American Oil Company office near you.

Quick facts about RYKON Grease "R"

- Flows like an oil. Under shearing action converts to grease.
- Resists moisture and protects against corrosion.
- Stable under high temperatures.
- Mechanically and chemically stable.

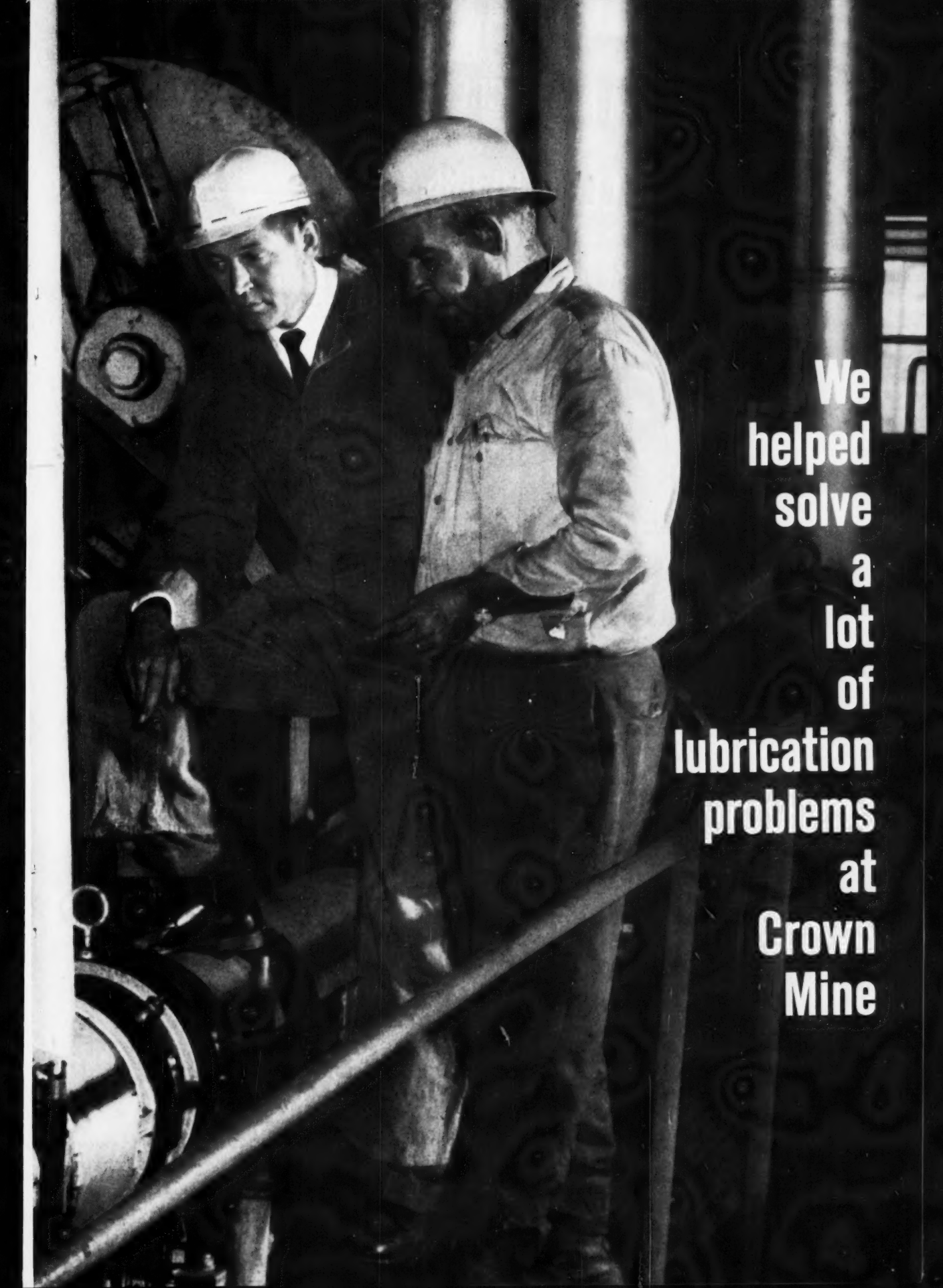


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- 3—7B Sullivan Cutting Machines
- 2—4JCM Joy Continuous Miners, 440 Volts AC.
- 1—T2-5APE Joy Machine Truck

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- 4—8BU Joy Loaders
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- 2—60E-10 Joy Shuttle Cars, modern.
- 2—6SC-7E Joy Shuttle Cars, modern.
- 1—6SC-5E Joy Shuttle Car, modern.
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- 1—32E-7 Joy Shuttle Car.
- 2—10SC-1F Joy Shuttle Cars, 500 Volt DC.
- 3—Model 48 TorKar Shuttle Cars.

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- 6—10RU Joy Cutting Machines—excellent
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- 2—29UC Jeffrey Universal Cutters.
- 2—29LC Jeffrey Top Cutters.
- 5—35B Jeffrey Cutters.
- 6—35BB Jeffrey Cutters.
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- 1—400 KW American Selenium Rectifier

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- 1—150 KW G.E. MG Set, primary 2300/4160, 1200 RPM
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- 1000"—26"—97C Goodman Belt Conveyor, complete.
- 1000"—26"—97C Goodman Belt Structure, only.
- 2—MTB-30 Joy Belt Head & Tails, only.
- 1000' Joy MTB-26 Conveyor, complete—excellent.
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- 1—350' LaDel Conveyor Line, complete
- 1—300' Joy Pans & Chains, complete.
- 5—61AM Jeffrey Conveyors—300' long.
- 1—61HG Jeffrey Chain Conveyor, 40' long.
- 1—Jeffrey 300—15' Chain Conveyor.

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- 1—1030 Goodman Locomotive, 24" high, 44" gauge.
- 1—13 Ton Goodman—Type 81A04T, Modern.
- 1—Goodman 13 Ton 136B-0-4-B w/75 HP Motors.
- 2—13 Ton Jeffrey Locomotives
- 1—Goodman 5 Ton 3012 with 50 HP Motor.
- 4—8 Ton 132AK42-48R Goodman w/2—50 HP Motors.
- 1—8 ton 32-0-4-T Goodman with 2—50 HP Motors.
- 1—8 ton LM2-8-T-DD G.E. with 2—50 HP Motors.
- 3—6 ton LM2-T-GMM G.E. with 2—35 HP Motors.
- 2—6 ton LM2-4-6-11 G.E. with 2—35 HP.
- 3—Greensburg Monitors complete charging equipment.

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- 5—PL11-16RPE Joy Elevators.

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- 1—36"x36" Double Roll Crusher with 100 HP Motor.
- 1—Robins 36"x36" Double Roll Stoker Crusher.
- 1—Pa. Single Roll Crusher—24"x40"
- 1—McNally Pittsburgh 24"x36" Stoker Crusher w/new segments.
- 1—American Pulverizer 36"x42", 200 tph—#AC-3B
- 1—American Pulverizer 24"x24", 30 tph—#WC-24
- 1—American Pulverizer 24"x30", 75 tph—#WC-30
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- 19—Sanford Day 3 Door Drop Bottom Cars, 36" high.
- 24—AC&F 3 Door Drop Bottom Cars, 34" overall height without 10" sideboards
- 173—AC&F Drop Bottom Cars, 48" high, new condition.
- 5—Mantrip Cars.

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- 1—CMI 48" Dryer with motors, drives, belt, etc., screen cloth 1/16" opening, capacity 50 tph.
- 1—Coppus Ventair Blower.
- 5—8x16 Allis Chalmers Pumps with motors.
- 1—16x14 Allis Chalmers Centrifugal Pump, complete.
- 1—Roberts & Schaefer Eplectic Vibrator.
- 1—Roberts & Schaefer Air Drying Plant, complete.

MOBILE EQUIPMENT

- 1—Koehring Heavy Duty Crane
- 1—Shovel Dipper Stock for same, 15' long, 3/4 yard dipper.
- 1—Hough Pay Loader, Model HF & HFH.
- 1—1950 International Flat Bed Tandem Truck.
- 1—Allis Chalmers Tractor M-Left.
- 1—Caterpillar Tractor D-6, 60" Gauge.

MACHINE TRUCKS, 250 Volts DC

- 2—T2-5APE Joy Machine Trucks.

COAL DRILLS

- 25—CP-472 Electric Coal Drills, 250 Volts DC.
- 5—CP-572 Coal Drills, 250 Volts DC.
- 10—Chicago Pneumatic Little Giant Coal Drills, 220 Volts AC.
- 2—CD-22 Joy Coal Drills, 250 Volts DC.
- 5—Doolley Self-Propelled Drill Trucks, twin-armed, track or rubber.

ROOF BOLTING MACHINES

- 2—Fletcher Roof Bolting Machine w/dust collectors.
- 1—RBD-30 Chicago Pneumatic Roof Drill.

HOISTS

- 10—Vulcan-Denver #11 1/2 Material Hoists w/motors.
- 1—Brownie Hoists, 5 HP AC
- 1—Joy CHD Hoists, 10 HP
- 1—Brownie Hoist, HKO, good condition.

COMPRESSORS

- 2—Acme Self-Propelled Air Compressors, Model 16B.

ROCK DUSTERS

- 2—Manson 24-S Wet Rock Dusters.
- 2—MSA Rock Dusters, 25 H.P. Track
- 2—MSA Santam Rock Dusters, rubber tired.
- 1—American Mine Door Rock Duster, 22" high.

FANS

- 1—Jeffrey 8H-42 Aerodyne Fan complete w/motor, "V" belt & tubing.
- 1—Jeffrey 8H-60 Aerodyne Fan complete w/G.E. 100 H.P., 440 V. AC Motor & Auxiliary Ford Industrial Power Unit.

CONTINUOUS MINERS

- 2—1CM Joy Continuous Miners, 250 Volts DC.
- 1—Goodman Continuous Boring Machine, 440 Volts AC, 250 HP, can be converted to twin borer.
- 1—5JCM Joy Continuous Miner with self-tramming and extensible belt, 440 Volt AC complete with 1000 ft. of structure and belting.

MISCELLANEOUS

- 20—40 lb. Switches, complete.
- 20—60 lb. Switches, complete.
- 1—American Mine Door Automatic Electric Throw Switch.
- 1—75 HP Starter for AC Wound Rotor Motor, drum type complete with resistance.
- 3—2300/4160 Y—230-115 Volt—200 KVA G. E. Transformers.
- 3—2300/115/230 Volt—15 KVA G.E. Transformers.
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- 1—Canton Track Cleaner, 42" gauge.
- 1—75 ton Fairbanks Morse Truck Scale.
- 1—5" Pomana Deepwell Pump
- 1—42" gauge Phillips Carrier.
- 1—Manson Mine Jeep, 40" gauge.
- 2—Lincoln 300 amp. MG type DC Welders
- 2—Hobart 300 amp. MG Type DC Welders
- 4—Guyan Resistance Bondar Welders.
- 495 ft.—1/9 Conductor 5000 Volt Rubber Covered Cable w/Ground.
- 2000 ft.—2/0-3 Conductor 2300 Volt Rubber Covered Bore Hole Cable.
- 3000 ft.—4/0-3 Conductor 5000 Volt Trench Cable.
- 4000 ft.—2/0-3 Conductor 5000 Volt Trench Cable.
- AC and DC motors ranging from 1 to 100 H.P.
- Complete inventory of new parts for 10SC, 10RU and 11BU Joy Equipment. Hundreds of other items such as pumps, motors, armatures, locomotive trucks, wheel units, hydraulic pumps, conveyor chain, cat chains, tippie draglines, etc., too numerous to list.

ALL EQUIPMENT LISTED AND HUNDREDS OF OTHER ITEMS ARE IN STOCK AND MAY BE INSPECTED
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JOY EQUIPMENT—REBUILT

- 3—Joy 14BU 9AE Super Loaders—26" Hi—New 1958.
- 2—Joy 14BU Loaders, low pedestal, 7AE, 1956 & 57.
- 4—Joy 14BU Loaders, medium pedestal, 7RBE.
- 2—Joy 14BU 7CE high pedestal loaders.
- 4—Joy 14BU 3PE Loaders.
- 2—Joy 12BU Loaders complete with Piggybacks.
- 2—Joy 12BU Loaders, 9E, latest type, 250 V. D.C.
- 3—Joy 12BU Loaders, 220/440 Volt A.C.
- 1—Joy 20BU Loader, latest type.
- 4—Joy 11BU Loaders, latest type.
- 1—Joy 8BU Loader, 34" overall height.
- 1—Joy 8BU Loader, 220 V. A.C.
- 1—Joy curved Bar Head for 14BU, complete.
- 6—Reliance 24-J Motors, 7½ H.P.
- 4—Reliance 38-J Motors, 10 H.P.
- 4—Reliance 40-J Motors, 15 H.P.
- 20—Reliance 9-J Motors, 4 H.P.
- 2—Goodman 660 Loaders on Crawlers 440 V. A.C., like new.
- 1—Goodman 660 Loader on Crawlers, excellent 250 V. D.C.
- 1—Goodman 665 Loader on Crawlers, latest type 250 V. D.C.
- 1—Goodman 865 Loader, 26" hi. Rebuilt. 250 V. D.C.
- 4—Joy 6SC Shuttle Cars, rebuilt.
- 5—ASC Shuttle Car, as removed from service.
- 4—Joy 6SC Shuttle Cars, rebuilt, latest type.
- 6—Joy 6SC Shuttle Cars, as removed from service.
- 1—Joy 5SC Shuttle Car, Excellent.
- 2—Joy 32E9 Shuttle Cars.
- 2—Joy 32E10 Shuttle Car, rebuilt.
- 6—Joy 32E15 Shuttle Cars, rebuilt.
- 4—Joy 32E16 Shuttle Cars, rebuilt.
- 10—Joy 32E16 Shuttle Cars, rebuilt and as is.
- 1—Joy CD-22 Drill, on rubber, like new.
- 6—Joy T-2-5 low pan Crawler Trucks, rebuilt.
- 1—Joy T-2-6 low pan Crawler Truck with reel.
- 2—Joy T-1 Standard Crawler Trucks, 220 A.C.
- 1—Joy T-1 Standard Crawler Truck, 250 D.C.
- 4—Joy T-1-B Cutting Mach., like new, 35 & 50 H.P.
- 4—Joy 7-B Cutting Mach., like new, 250 & 500 V.
- 4—Goodman 212 Cutting Machines, 19" high.
- 2—Goodman 212 Cutting Machines, 17" high.
- 2—Goodman 412 Cutting Machines, 19" high.
- 1—Goodman Machine on Crawler, 31" high. All hydraulic.
- 6—Goodman 512 Machines with Bugbusters. Rebuilt and as removed from service.
- 6—Goodman 612 Cutting Machines, 250 and 500 V.
- 1—Jeffrey 70 URB rubber tired Truck, Universal head, perfect condition.
- 1—Goodman 2410 Rubber Tired Cutter, Universal head, like new.
- 2—Joy 11RU Rubber Tired Cutters with Bugbusters, Universal heads, dual tires, like new, 250 V. D.C.
- 1—Joy 10RU Rubber Tired Cutter, Universal head, 220/440 V. A.C. Perfect.
- 4—Joy 10RU Rubber Tired Cutters, Universal head, 250 V. D.C. Rebuilt or as is.
- 6—7AU's on track, Universal head.
- 2—Jeffrey 29UC Cutting Machines, Universal head, cuts anywhere in seam, 38" high, on Crawlers, 250 volt D.C.
- 4—Jeffrey 29LC on Crawlers, rebuilt or as removed from service.

LOCOMOTIVES

- 1—Goodman 6 ton, 93-A, 27" hi, armor plate frame.
- 1—Jeffrey 15 ton MH-77 Locomotive, armor plate frame.
- 7—Jeffrey, 13 ton, Type MH-110, 36", 42", 44" ga.
- 2—Jeffrey, 10 ton, type MH-110, 42" and 44" ga.
- 2—Jeffrey, 10 ton, type MH-78, 42" and 44" ga.
- 2—Goodman 8-30 and 10-30 Locos., 26" above rail.
- 1—Jeffrey MH-150, 6 ton, 28" overall height, rebuilt with reel.
- 12—Jeffrey, 6 ton, type MH-88, 42", 44" and 48" ga.
- 4—Jeffrey, 8 ton, type MH-100 2½" armor plate frames.
- 3—Jeffrey, 4 ton, type MH-96, 42", 44", 48" ga.
- 1—G.E., 4 ton, type 825 Locomotive, 22" high.
- 10—G.E., 6 ton, types 801, 803, 821 Locomotives, 42", 44" and 48" ga.
- 1—G.E., 8 ton, type 822 Locomotive, 44" ga.
- 3—G.E., 10 ton, type 809 Loco., 42", 44", 48" ga.
- 2—G.E., 13 ton, type 829 Loco., armor plate frames.
- 1—Goodman 91A Loco., 8 ton, 26" overall ht.
- 2—Goodman, type 33, 6 ton, 44" and 48" ga.
- 3—Westinghouse, type 902, 4 ton, 42" and 48" ga.
- 1—Atlas Battery Locomotive 36" ga.
- 1—Atlas Trolley Locomotive, 4 ton, 24" high.
- 2—Westinghouse, type 904, 6 ton, 44" and 48" ga.
- 2—Westinghouse, type 906, 44" and 48" ga.
- 2—Westinghouse, type 907, 10 ton, 44" & 48" ga.
- 3—Westinghouse 908, 13 ton, Loco., 42" & 48" ga.
- 8—Jeffrey MH-78 Locomotive Unit, cheap.
- 4—Jeffrey MH-88 Locomotive Units, real bargains.
- 6—Jeffrey MH-100 Locomotive Units, reasonable.

- 3—Plymouth Diesel Locomotives, 8 and 10 tons, 42" and 44" ga.
- Locomotive Trucks & Spare Armatures for the above.

TIPPLE EQUIPMENT

- 1—All Steel 5 Track Tipple, new 1957, complete with washer, silo, oil treating system, all bolted construction.
- 1—Complete Five Track Tipple with Washers and Air Tables.
- 1—Complete stoker plant, all steel.
- 2—Complete tipples, 3 & 5 track, steel and wood.
- 3—Cleaning Plants, 1 Ea. McNally, Roberts and Schaefer, Jeffrey, Washers and Air-Fluo Tables.
- 4—Complete Aerial Trams for coal or refuse.
- 3—Complete Rope and Button Lines.
- 2—Monitor Lines complete with Drums, excellent.
- 1—Allis-Chalmers 5' x 12' Rippole Vibrator.
- 1—Allis-Chalmers 4' x 12' Low-Head Vibrator.
- 1—Robins Gyrex Vibrator, 4 x 10.
- 10—Belt and Apron type Loading Booms.
- 6—Shaker Screens.
- 1—Robins Car Shakeout.
- 1—Gundlach Crusher, like new.
- 20—Crushers, various sizes—Jeffrey, Link-Belt, McLaughlin & McNally.
- 4—Mine Scales, 10 & 20 ton.
- 5—Truck Scales, 25 to 40 ton, late type.
- Feeders, Belt and Drag Conveyors, Car Retarders.

CUTTING MACHINES

- 1—Joy 10RU Rubber Tired Cutter, Universal head, 220/440 volt A.C. Perfect.
- 3—Joy 10RU Rubber Tired Cutters, Universal head, 250 V. D.C. As is or rebuilt.
- 2—Joy 11RU Rubber Tired Cutters, 250 V. D.C.
- 1—Goodman 2410 Rubber Tired Cutter, Universal head, new 1956. Excellent.
- 2—Jeffrey 29UC Universal Machines on Crawlers.
- 1—Goodman on Crawlers, 31" overall height.
- 4—Baby Goodman 212's, rebuilt, 250 V. D.C.
- 2—Goodman 312 Cutting Machines, 17" high.
- 3—Goodman 412 Cutting Machines, 19" high.
- 6—Goodman 512's, with Bugbusters, like new.
- 4—Goodman 512's, rebuilt, or as removed from service.
- 6—Goodman 612's—250 & 500 Volt.
- 3—Goodman 112's, 220/440 V. A.C.
- 4—Joy 7-B Cutting Machines, 250 and 500 Volt.
- 4—Joy 11B Cutting Machines rebuilt, 35 & 50 H.P.
- 6—7AU's on track, Universal Head.
- 10—Goodman 12AA's and 12AA's, 250 V. D.C.
- 2—Goodman 324 Slabbers.
- 2—Goodman 724 Slabbers.
- 2—Goodman 824 Slabbers.
- 6—Jeffrey 35L's, like new, 250 V. D.C., 17" high.
- 2—Jeffrey 35L's, on low vein trucks.
- 2—Jeffrey 35L's 220/440 A.C.
- 3—Jeffrey 35B's, 220/440 A.C.
- 15—Jeffrey 35B's and 35B's 250 V. D.C.
- 2—Jeffrey 29B's on track.
- 10—Jeffrey 29C's, track mounted.
- 2—Jeffrey 29L's on Crawlers, Excellent.
- 4—Sullivan CE7, 220/440 V. A.C.

CONVEYORS

- 2—Joy 1200' Belt Conveyors, 30". Limberoller, "like new."
- 1—Each 30" and 36" Joy 1000' extensible belt, latest type, like new.
- 1—Goodman 97HC 30" Rope Belts, 1000' perfect. With or without rubber.
- 4—Jeffrey 52-B tandem drive 30" and 26" Belt Conveyors, 500' to 2000'.
- 1—Jeffrey 52-B tandem drive 26" Belt Conveyor.
- 1—Joy 30" Underground Belt Conveyor, Excellent.
- 1—Goodman 97-C, 30" tandem drive.
- 1—Robin 36" tandem drive, with or without motor.
- 5,000' 52-B Belt Structure, 30".
- 1,000' Conveyor Belt, 42".
- 1,500' Conveyor Belt, 36".
- 2,000' Conveyor Belt, 30".
- 1,000' Conveyor Belt, 26".
- 8—Jeffrey 61AM 12" Chain Conveyors, 300'.
- 2—61EW Elevating Conveyors.
- 2—61WH 15" Room Conveyors, 300'.
- 2—Joy 15" Room Conveyors, 300'.
- 2—Joy 20" Conveyors, 300'.
- 4—Joy Ladel UN-17 Shakers.
- 10—Goodman 6-12½" and 6-15 Shakers.
- 1,000' Goodman 18" Flat Belt Conveyors, tandem drive any length. Perfect.

CONVERTERS AND DIESEL PLANTS

- 2—500KW G.E. Stationary Rectifiers.
- 4—1,000KW Stationary Rectifiers.
- 2—100KW, G.E. TCC-6's, 275 V., Rotary Converters.
- 1—150KW, G.E. HNC-6, 275 V., Rotary Converter.
- 1—150KW, 6 phase, Allis-Chalmers Rotary Converter, 275 V. D.C.
- 2—200KW G.E. HCC-6's, Rotary Converters, 275 V. D.C. Steel frames, Newly rewound.

- 3—300KW G.E. HCC-6's Rotary Converters, 275 V. D.C. Like New.
- 2—300KW Westinghouse, 6 phase, Rotary Converters, 275 V. D.C.
- 2—500KW West. Rotary Converters, 275 V. D.C.
- 1—200KW Westinghouse Rotary Converters, 275 V. D.C. Newly rewound.
- (All the above with 6900/13000 and/or 2300/-4000 primary transformers)
- 1—50KW MG Set.
- 1—100KW MG Set, 275 V. D.C.
- 6—150KW MG Sets, G.E. and West., 275 V. D.C.
- 2—200KW MG Sets, West., rebuilt, 275 V. D.C.
- 1—200KW MG Set, G.E., perfect, 275 V. D.C.
- 2—300KW G.E. MG Sets, like new.
- 3—300KW Westinghouse MG Sets, 275 V., rebuilt.
- 1—300KW Westinghouse, 600 volt MG Set, rebuilt.
- 2—300KW West., 600 volt, 6 phase, Rotary Conv., Rotary Converters.
- 2—500KW Westinghouse, 600 volt, D.C., 6 phase, Rotary Converters.
- 2—500KW HCC-6's, Rotary Conv., 6 phase, 600 V. D.C.
- 3—GMC-671 Diesels w/75 & 110KW, 250 V. D.C. Gen.
- 1—GMC-471 Diesel with 60 KW, 250 V. D.C. Gen.
- 1—100KW Natural or LP Gas Engine with Generator.

LOADING MACHINES

- 16—Joy Loaders, 14BU, 12BU, 8BU, 11BU, 20BU.
- 5—Joy 12BU9E Loaders, 220/440 V. A.C. Excellent.
- 3—Joy 12BU9E Loaders, latest type.
- 2—Joy 12BU with Piggyback Conveyors.
- 2—Goodman 865 Loaders, 26", on Crawlers.
- 1—Goodman 865 Loader, on Crawlers, rebuilt.
- 2—Goodman 660 Loaders, 440 V. A.C. perfect.
- 1—Goodman 660 Loader, on Crawlers, 250 V. D.C.
- 1—Goodman 460, on track, rebuilt, all hydraulic.
- 2—Jeffrey 61 CLR's on rubber, 26".
- 3—Jeffrey L-500 Loaders.
- 2—Myers Whaley, No. 3 Automatic Loaders.
- 2—Clarkson Loaders, 26" above rail.

MISCELLANEOUS

- 1—Jeffrey 76-A ColMol, 220/440, perfect.
- 1—Joy 5 JCM Continuous Miner, 220/440, perfect.
- 150 Tons Copper—4/0 and 9 Section Trolley 1/0, 2/0, 4/0 Stranded. 500 MCM, 750 MCM—1,000,000 MCM Insulated.
- 1—Each 4'-5' 6" & 8" Hi Pressure Joy & Jeffrey latest type fans.
- 1—Complete Five Track Tipple with Washers and Air Table.
- 5—Complete Tipples, 3 to 5 track. Wood and Steel.
- Steel Trestles for drop bottom cars.
- All Steel Armo Buildings.
- 20—Jeffrey Moiveyors on rubber tires.
- 1—¾ Yard Shovel and Back-Hoe.
- 4—¾ Yard Crawler Cranes, Gas and Diesel.
- Battery Supply Tractors, Rubber Tired.
- 1—Cantrell Air Compressor on rubber tires.
- 10—Air Compressors, 1 H.P. to 40 H.P.
- 1—Joy self-propelled rubber tired comp., 240 cu. ft.
- 1—Acme self-propelled rubber tired compressor, 130 cu. ft.
- 40—Mine Pumps, all types.
- 1—Differential 40 Passenger Man-Trip Car.
- 6—MSA Rock Dusters.
- Joy Roof Drills—Schroeder Coal Drills.
- 2—Phillips Carriers, 44" and 48" ga.
- 1—Barber-Greene self-propelled Bucket Elevator.
- Pipe, Plastic, Steel, Transit, all sizes 1" to 6".
- 25,000 Roof Bolts, all types.
- 300—Mine Cars, drop bottom, 42" ga.
- 50—Mine Cars, drop bottom, 48" ga.
- 90—Mine Cars, drop bottom, 44" ga.
- 100—Mine Cars, 18" high, end dump, 44" ga.
- 300—Mine Cars, end dump and drop bottom, 20" high, 48" ga.
- 1—10 ton Mine Car Scale with Recorder.
- 4—Brown Fayro 15 HP latest type Hoists.
- 15—Brown Fayro NKL and MG Car Spotters.
- 1—Brown Fayro Hydraulic Car Spotter.
- 1—12 ton Differential State Larry.
- Incline Hoists, 25 to 150 H.P.
- Shaft Hoists to 700 H.P. Complete.
- 1—Jeffrey 5', 6', & 8' Aerodyne Fans, Like New.
- 2—Storage Tanks, 4,000 Gallons.
- 2—Storage Tanks, 10,000 Gallons.
- 10,000 Five Gallon G.I. Cans, screw lids.
- 2,500 tons Relaying Rail, 25lb., 30lb., 40lb., 50lb., 60lb., 70lb., 90lb., 100lb.
- 500 MCM, 750 MCM, 1000 MCM, Bare & Insulated. Thousands of feet of rubber covered three conductor cable. All sizes.
- 300—Transformers from 1 to 300 KVA, 110 to 13,000 primary volts.
- 400—Electric Motors, 3 to 250 H.P.
- Huge Stock of Mine Supplies.
- 600—MSA Mine Lamps, Chargers, etc.
- 4—Mine Scales, 10 & 20 ton.
- 5—Truck Scales, 25 to 40 ton, late type.
- Mack & International tandem dump trucks.
- THOUSANDS OF OTHER ITEMS.

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LOGAN, WEST VA.

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Versatile Cat Wheel Loader scores high in tough grind at 3-shift tungsten mine



Cat Wheel Loader makes fast work of truck loading at Tungsten Mining Corp. operation, Henderson, N.C. The cut and fill method is used to mine the tungsten-bearing quartz rock. Ore is brought to the surface, loaded into trucks and transported to the processing mill. The waste material is then returned to the mine for use as fill.

TUNGSTEN MINING CORPORATION keeps its Cat 944 Wheel Loader rolling 24 hours a day, six days a week. On first shift at the mill the 2 yd. 944 truck loads ore tailings which are hauled back to the mine and dumped down or near the shaft. On second and third shift the loader runs back to the mine and dozes the stockpiled tailings into the shaft, backfilling the mined area.

"There are several big reasons why we've got a 944 doing this work," Vice President and General Manager W. L. Kendrick told us. "Look at it step by step: first of all we need dependability when we're running a machine 24 hours a day, and our experience with Cat has been just that—dependability. In the truck-loading operation, I don't think there's a faster-cycling loader than the 944. Its excellent visibility, power shift transmission and automatic bucket positioners really simplify the operator's job. At the mine we've got the loader working as a bulldozer in that tough abrasive quartz.

The 944 doesn't spin its tires much; it's got the proper power-to-weight ratio to push that stuff without spinning. And when an operator is running the loader from the plant out to the mine, the tight steering gives him confidence to roll fast, not waste time snailing along the highway."

For speed, durability and utility in any mining operation, you can't beat Cat Wheel Loaders. There are three diesel-powered units to choose from with bucket capacities up to 4 yd. (Gasoline power is optional on the two smaller models.) Ask your Caterpillar Dealer for specific mine application data. He'll show you how to cut your handling costs. Caterpillar Tractor Co., General Offices, Peoria, Ill., U.S.A.

CATERPILLAR

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**CAT LOADERS
FOR SPEED,
FOR LOWER COSTS**

THIS IS MSA: Illumination • Electronic Communication and Control • Rock Dusting and Dust Collecting • Fire Fighting Equipment • Respiratory Protection • Artificial Respiration Equipment • Personal Protective Wear • First Aid Equipment • Permanent and Portable Instruments

Coal comes quicker with increased working light

Now Edison Model S Electric Cap Lamps give you *more* working light than any other cap lamp.

They're throwing *more* light on the subject of man-hour productivity, too. This is the safe lamp for the miner . . . the dependable lamp for you.

Miners themselves come up with the best reasons why: 15% increase in working light . . . small lightweight headpiece . . . 400 hours bulb life in each filament . . . longer battery life . . . clear, sharp spot every time . . . and so it goes.

As for charging: no new charging racks required . . . takes either constant current or constant voltage . . . over-charging or under-charging won't affect battery life . . . never a labor-scheduling problem.

Such an increase in working light can cast a favorable image on your operating sheet. Ask your MSA Representative about it. Mine Safety Appliances Company, Pittsburgh 8, Pennsylvania. In Canada: Mine Safety Appliances Company of Canada, Ltd., 500 MacPherson Avenue, Toronto 4, Ontario.

MINE SAFETY APPLIANCES COMPANY 



10-yard P&H electric long range dragline is the largest excavator mounted on a single pair of crawlers. Unmatched for maneuverability and speed for draglines of such long booms and large buckets. Equipped with Magnetorque drive for drag and hoist as well as swing and propel motions.



P&H WITH MAGNETORQUE DRIVE — gets you down to coal faster... loads it out quicker

It's good business to standardize on P&H electric shovels and draglines, diesel excavators and truck cranes. There's a size and type for every job.

Full-Electric and Diesel-Electric Shovels and Draglines, from 3½ to 10 yards, deliver up to 10% more production with exclusive MAGNETORQUE Drive—the most productive work-motion drive known for mining excavators. It's the system that electro-magnetically transmits the driving energy of the

1¼-yd. P&H excavator loads coal into trucks. Exclusive P&H Magnetorque Swing delivers the smoothest, fastest, most trouble-free swings in the industry.

power plant (A.C. electric motor or diesel engine) direct to the work motions without intermediate conversion to D.C. current.

Diesel Excavators, from ½ to 4½ yards, pay for themselves fast. Among the various models, you get important features such as: Magnetorque swingers have the smoothest, fastest swing motions... Sealed Power Box design with all gears running in an oil bath, completely sealed from dust and dirt for trouble-free, maintenance-free operation.

Versatile Truck Cranes, from 12½ to 90 tons. Mobile units that handle secondary road-building, drainage, refuse disposal, maintenance and 101 utility jobs.

P&H acceptance and experience in coal mining has kept in step with industry developments from use of the previous smaller capacity draglines to the present day workhorse of the industry—the 10-yard P&H Electric Long Range Dragline that consistently delivers higher production at a lower unit cost.

We welcome comparisons—they bring superior P&H profit-producing abilities out in the open. Write today for more information.

HARNISCHFEGER P&H
Milwaukee 46, Wisconsin



